

Professional

Engineering

Services

Eastern and Western Receiving Stations

Contract 2-2025

Project Manual

City of Crest Hill

Crest Hill, Illinois

Issued for Bid

February 17, 2026



PLAN HOLDER: _____

Set No.: _____

PROJECT MANUAL

CITY OF CREST HILL
CREST HILL, ILLINOIS
EASTERN AND WESTERN RECEIVING STATIONS
CONTRACT 2-2025



Jack J. Jenkins
2/17/2026
EXP. 11/30/2026



Richard E. Scheer
2-17-26
exp NOV 30 27



Brent M. Studnicka
2/17/2026
Exp. 11/30/2027

Prepared by:

STRAND ASSOCIATES, INC.®
IDFPR No. 184-001273
1170 South Houbolt Road
Joliet, IL 60431
www.strand.com

Issued for Bid
February 17, 2026



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CREST HILL, ILLINOIS
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ADVERTISEMENT TO BID

CITY OF CREST HILL
CREST HILL, ILLINOIS
EASTERN AND WESTERN RECEIVING STATIONS
CONTRACT 2-2025

The City of Crest Hill (OWNER) is requesting Bids for the construction of the following Project:

Eastern and Western Receiving Stations
Contract 2-2025

Electronic Bids for the construction of the Project will be by OWNER until April 17, 2026, at 2 P.M., local time. At that time the Bids received will be publicly downloaded and read aloud via teleconference. The login information for the teleconference is as follows: (651) 372-8299, Conference ID 973 8992 4091.

The Project includes the following work at two different locations: At the West Station, construction of a 22-foot by 34-foot brick and block receiving/metering station and associated electrical improvements; supervisory control and data acquisition (SCADA) system; and heating, ventilation, and air conditioning (HVAC). Site work at the West Station includes underground piping, concrete driveway, and landscaping. At the East Station, work will include construction of a 80-foot by 39-foot brick and block receiving/pump station and associated electrical improvements; SCADA system; HVAC; yard piping; and site work. Site work at the East Station includes underground piping valving, sanitary and storm sewers, a concrete driveway, and landscaping.

There will be two bid alternatives. One Bid Alternative will be for a system-wide SCADA upgrade. SCADA upgrades will be done at OWNER's existing wellhouses and water treatment plants. A second bid alternative will consist of construction of approximately 2,000 feet of buried conduit and conductors along with miscellaneous electrical improvements. The proposed conduit will be installed running from the proposed East Receiving/Pumping Station to an existing diversion structure west of the East Receiving Station.

Complete digital Project Bidding Documents are available at www.strand.com or at www.questcdn.com. Download the digital Bidding Documents for \$75 by inputting Quest project number 10060839 on the website's project search page. Please contact QuestCDN.com at (952) 233-1632 or info@questcdn.com for assistance with free membership registration, downloading, and working with this digital Project information.

For this Project, Bids will **ONLY** be received and accepted via the online electronic Bid service through QuestCDN.com. To access the electronic Bid Form, download the Project Documents and click the Online Bidding button.

The Issuing Office, is Strand Associates, Inc.®, 1170 Houbolt Road, Joliet, IL 60431.

All Bidders submitting a sealed Bid shall obtain the Bidding Documents from QuestCDN.com.

Bidders who submit a Bid must be a Plan Holder of record at the Issuing Office. Bids from Bidders who are not on the Plan Holders List may be returned as not being responsive.

The Bid must be accompanied by Bid security made payable to OWNER in an amount of 10% of the Bidder's maximum Bid price.

Bidders will be required to comply with all laws, including those relating to the employment of labor and the payment of the general prevailing rate of hourly wages in the locality in which the work is to be performed for each craft or type of worker or mechanic needed to execute the contract or perform such work, also the general prevailing rate for legal holiday and overtime work (including, but not necessarily limited to 820 ILCS 130/1-12 the "Prevailing Wage Act") as ascertained by the City or by the Illinois Department of Labor for Will County, Illinois shall be paid for each craft or type of worker needed to execute the contract or to perform such work.

If at the time this Contract is executed, or if during the term of this Contract, there is excessive unemployment in Illinois as defined in the Employment of Illinois Workers on Public Works Act, 30 ILCS 570, as two consecutive months of unemployment exceeding 5%, CONTRACTOR agrees to employ a work force that consists of at least 90% Illinois laborers. An "Illinois laborer" is defined as any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident. The Bidder shall require all subcontractors (if any) to conform with said laws, and any rules or regulations now and thereafter issued pursuant to said laws by Bidder, his subcontractors, and/or anyone working through or on behalf of Bidder or Bidder's subcontractors.

Any contract or contracts awarded under this invitation for bids are expected to be funded in part by a loan from the Illinois Environmental Protection Agency. Neither the State of Illinois nor any of its departments, agencies, or employees is or will be a party to this invitation for bids or any resulting contract. The procurement will be subject to regulations contained in the Procedures for Issuing Loans from the Public Water Supply Loan Program (35IAC Part 662), the Davis-Bacon Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor, the Employment of Illinois Workers on Public Works Act (30 ILCS 570), Illinois Works Jobs Program Act (30 ILCS 559/20-1), and the federal "Build America, Buy America Act" requirements contained in the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58.

This procurement is also subject to the loan recipient's policy regarding the increased use of disadvantaged business enterprises. The loan recipient's policy requires all bidders to undertake specified affirmative efforts at least 16 days prior to bid opening. The policy is contained in the Specifications. Bidders are also required to comply with the President's Executive Order No. 11246, as amended. The requirements for bidders and contractors under this order are explained in 41 CFR 60-4.

The City of Crest Hill reserves the right to reject any or all Bids, to waive any technicality, and to accept any Bid which it deems advantageous. All Bids shall remain subject to acceptance for 135 days after the time set for receiving Bids.

Contract award shall be made based on the lowest responsive and responsible Bidder for the Base Bid. Bid alternatives will be considered after the low responsive bidder is selected.

A pre-bid conference will be held at 11 A.M. local time, on March 26, 2026, at the City of Crest Hill, 20600 City Center Boulevard, Crest Hill, IL 60403. Bidders are encouraged to attend and participate in the conference.

The Strand Associates, Inc.[®] project manager is Richard Scheer, P.E., who can be contacted at Strand Associates, Inc.[®], 1170 Houbolt Road, Joliet, IL 60431, (815) 744-4200 regarding the Project.

For all further requirements regarding Bid submittal, qualifications, procedures, and Contract Award, refer to the Instructions to Bidders that are included in the Bidding Documents.

Published by the authority of the City of Crest Hill, Illinois
Mayor Raymond R. Soliman

Dated at Crest Hill, Illinois
February 17, 2026

END OF SECTION

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

- A. These Instructions to Bidders establish requirements for Bidding and Award of Contract.
- B. These articles are not necessarily numbered consecutively.
- C. Table of Contents

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ARTICLE 1–DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and the Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

- A. Issuing Office–The office from which the Bidding Documents are to be issued and which registers planholders.

ARTICLE 2–BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Electronic Documents

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 6.0 or later. It is the intent of ENGINEER and OWNER that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because OWNER and ENGINEER cannot totally control the transmission and receipt of Electronic Documents nor CONTRACTOR's means of reproduction of such documents, OWNER and ENGINEER cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.03.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3–QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, within five days of OWNER's request, Bidder shall submit the Qualifications Statement.

3.02 Bidder must be prepared to submit evidence of Bidder's qualifications to do business in the state where the Project is located prior to award of the Contract.

3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.04 Bidders shall submit the documentation listed in Paragraph 7.01 of the Bid Form (Section 00 41 00).

3.05 No requirement in this Article 3 to submit information will prejudice the right of OWNER to seek additional pertinent information regarding Bidder's qualifications.

3.06 Bidder is advised to carefully review those portions of the Bidding Documents requiring Bidder's representations and certifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A pre-bid conference will be held at the time, date, and place indicated in the Advertisement or Invitation to Bid.

Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

4.02 Information presented at the pre-bid conference does not alter the Contract Documents. OWNER will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 Site and Other Areas

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by OWNER for the use of CONTRACTOR. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by CONTRACTOR.

5.02 Existing Site Conditions

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

b. Those drawings known to OWNER of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

c. Reports and drawings known to OWNER relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. OWNER will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. **Underground Facilities:** Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 Other Site-Related Documents

A. No other Site-related documents are available.

5.04 Site Visit and Testing by Bidders

A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

D. On request, and to the extent OWNER has control over the Site, and schedule permitting, OWNER will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. OWNER will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on OWNER's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

E. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by OWNER or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

F. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 OWNER's Safety Program

A. Site visits and work at the Site may be governed by an OWNER safety program. If an OWNER safety program exists, it will be noted in the Supplementary Conditions.

5.06 Other Work at the Site

A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which OWNER is aware (if any) that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If OWNER is party to a written contract for such other work, then on request, OWNER will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6–BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 Express Representations and Certifications in Bid Form, Agreement

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as CONTRACTOR) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7–INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to ENGINEER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Issuing Office as having received the Bidding Documents.

7.02 All requests for interpretation must be received at least five business days prior to the day set for receiving Bids. Addenda will be issued not later than three business days prior to the time and day set for receiving Bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligations under the Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

7.03 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8–BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of 10% of the Bidder's maximum Bid price and in the form of Surety2000, a certified check, bank money order, or a Bid Bond (on form attached) issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. A PDF copy of the Bid Bond can be attached to electronically submitted Bids.

8.02 The Bid security of the apparent Successful Bidder will be retained until OWNER awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, OWNER may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in

the case of a Penal Sum Bid Bond, and to the extent of OWNER's damages in the case of a damages-form bond. Such forfeiture will be OWNER's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of 7 days after the Effective Date of the Contract or 136 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that OWNER believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.

9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE OR “OR EQUAL” ITEMS

10.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without evaluation of Alternative Equipment Manufacturers listed in the Lump Sum Base Bid, if any, and without evaluation of possible substitute or “or equal” items. Whenever it is specified or described in the Bidding Documents that an Alternative Equipment Manufacturers listed in the Lump Sum Base Bid or that a substitute or “or equal” item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be evaluated by ENGINEER until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that CONTRACTOR will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 Subsequent to the submittal of the Bid, OWNER may not require the Successful Bidder or CONTRACTOR to retain any Subcontractor, Supplier, or other individual or entity against which CONTRACTOR has reasonable objection.

11.02 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to OWNER a list of the Subcontractors or Suppliers proposed for the Work. If requested by OWNER, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity.

ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form shall be completed and the Bid Forms shall be signed. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

C. All blanks on the Bid Form must be filled and all required documents uploaded before QuestCDN.com will accept the Bid. The Bid shall be signed electronically where required and in accordance with the instructions included in this Article.

12.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.

12.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address and state of incorporation shall be shown.

12.04 A Bid by a limited liability company shall be executed in the name of the firm by a member, if the LLC is member-managed, or by a manager, if manager-managed, and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

12.05 A Bid by an individual shall show the Bidder's name and official address.

12.06 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.07 All names shall be printed below the signatures.

12.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

12.09 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.10 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

12.11 All Bids shall be signed in the presence of and be notarized by a Notary Public or other Officer authorized to administer oaths.

ARTICLE 13–BASIS OF BID

13.01 Lump Sum Base Bid with Bid Alternatives and Equipment Alternatives

A. Bidders shall submit a Bid on a Lump Sum Base Bid basis. The price for the Base Bid equipment for each alternative equipment item shall be included in the Lump Sum Base Bid. Bidder shall include a separate Bid price for each Bid Alternative described in the Bidding Documents and as provided for in the Bid Form. The price for each Bid Alternative will be the amount to be added to or deducted from the price of the Base Bid if OWNER selects the Bid Alternative.

B. Bid Alternative add or deduct prices shall include the entire cost of the Bid Alternative and additional work to be performed, including engineering changes, necessary to accommodate the Bid Alternative, which is not shown on the Drawings but is required as a result of selection of the Bid Alternative.

C. The name of the Base Bid Equipment Manufacturer, which Bidder shall include in the Lump Sum Base Bid, is listed for each equipment item. When more than one Base Bid Equipment Manufacturer name is listed for an item, Bidder shall circle the name of the equipment manufacturer selected for the Lump Sum Base Bid and write in the price for the selected equipment.

D. Where a Requested Alternative Equipment Manufacturer is listed in the Bid Form, Bidder shall include an add or deduct to the price of the Base Bid equipment that Bidder included in the Lump Sum Base Bid. The add or deduct price shall include the cost of any changes, including engineering changes, necessary to accommodate the alternative equipment including, but not limited to, process, structural, mechanical, and electrical work.

E. Where spaces are provided, Bidder may write in Other Alternative Equipment Manufacturers into the blank(s) provided on the Bid Form and include an add or deduct to the price of the Base Bid equipment that Bidder included in the Lump Sum Base Bid. The add or deduct price shall include the cost of the engineering services required for review of the alternative equipment in comparison to the Base Bid equipment and shall include the cost of any changes, including engineering changes, necessary to accommodate the alternative equipment including, but not limited to, process, structural, mechanical, and electrical work.

F. Whether or not an Alternative Equipment Manufacturer is offered to one or more Base Bid Equipment Manufacturers provided in the Bid Form, Bidder shall write (in numbers) the price for providing the Base Bid Equipment Manufacturer, as included in the Lump Sum Base Bid.

G. Failure to provide a separate price for each Bid Alternative and for each Base Bid equipment item may result in OWNER declaring Bid nonresponsive. Consideration of Bid Alternatives will be made prior to the Notice of Award. Consideration of Alternative Equipment Manufacturers will be made by OWNER within 60 days after the Effective Date of the Contract.

13.02 Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. For Bids submitted on a Lump Sum basis, discrepancies between words and figures will be resolved in favor of the words.

13.03 For Cash Allowances the Contract Price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of Cash Allowances, if any, named in the Contract Documents as provided for in Paragraph 13.02.B of the General Conditions. The final Contract Price will be adjusted to reflect actual costs on account of Cash Allowances.

13.04 The following Cash Allowances shall be included in the Bid for Contract(s).

Office Furniture	Section 12 51 00—Office Furniture
SCADA Computer	Section 26 09 00—Controls and Instrumentation
Electrical Service	Section 26 21 00—Electrical and Internet Service System
Internet Service	Section 26 21 00—Electrical and Internet Service System
Unsuitable Foundation Material for Structures and Roads	Section 31 23 00—Excavation, Fill, Backfill, and Grading
Unsuitable Foundation Material for Utility Trenches	Section 31 23 00—Excavation, Fill, Backfill, and Grading
Spare Parts for Pumps	Section 43 23 21.13—Centrifugal Pumps

ARTICLE 14—SUBMITTAL OF BID

14.01 Bids will be received for all divisions of the Specifications and all other provisions of the Bidding Documents.

14.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid.

14.03 Bids received after the date and time prescribed for the opening of Bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BIDS

15.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time set for receiving Bids.

15.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further Bidding on the Work.

ARTICLE 16—OPENING OF BIDS

16.01 Bids will be downloaded at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously nonresponsive, read aloud publicly. An abstract of the amounts of the Base Bids and major alternatives and components, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17–BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18–EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 OWNER reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. OWNER also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 OWNER will reject the Bid of any Bidder that OWNER finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to OWNER or ENGINEER, then OWNER will reject the Bid as nonresponsive.

18.04 In evaluating Bids, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such alternatives, unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.

18.05 In evaluating Bids, OWNER will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

18.06.1 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals or entities to perform the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time. Bidder shall furnish to OWNER all such information and data for this purpose as OWNER may request. OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the work contemplated therein.

18.06.2 OWNER shall be satisfied that Bidder involved (1) maintains a permanent place of business, (2) has adequate plant and equipment to do the work properly and expeditiously, (3) has a suitable financial status to meet obligations incident to the work, (4) has appropriate technical experience, and (5) can submit a satisfactory performance record.

18.07.1 If a Contract is to be awarded, it will be awarded to the responsible Bidder with the lowest responsive Lump Sum Base Bid.

18.07.2 OWNER reserves the right to accept or reject any Bid Alternatives or Alternative Equipment Manufacturers to the Lump Sum Base Bid after award is performed on the evaluation of the Lump Sum Base Bid only. Should OWNER wish to consider Bid Alternatives listed, Bidder may be required to provide additional information as listed in Article 7.06 of the General Conditions prior to the Notice of Award. If a Bid Alternative is selected by OWNER, the awarded Contract price

will include the selected alternative(s). Consideration of Alternative Equipment Manufacturers of the selected Bidder will be made by OWNER within 60 days after the Effective Date of the Contract.

18.08 If a Contract is to be awarded, OWNER will give the successful Bidder a Notice of Award within 110 days after the time set for opening Bids.

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing Bid Bonds as part of the Bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

20.01 When OWNER gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unexecuted counterparts of the Agreement along with all other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement and attached documents to ENGINEER with the required Bonds and insurances. Within 10 days after receipt of properly executed documents and Bonds and insurances which meet all requirements of the Contract Documents, ENGINEER will deliver one fully signed counterpart to Successful Bidder.

ARTICLE 21—RETAINAGE

21.01 Provisions concerning retainage are set forth in the Agreement.

ARTICLE 22—WAGE RATE DETERMINATION

22.01 A wage rate determination will be inserted as a part of the Bidding Documents and/or will be on file at the office of OWNER. Bidders shall inspect the wage rate determination and shall incorporate its requirements into their Bid.

22.02 Davis-Bacon federal wage rate determination will be inserted as a part of the Bidding Documents and/or will be on file at the office of OWNER. Bidder shall inspect the wage rate determination and shall incorporate its requirements into its Bid.

22.03 The higher wage rate determination shall apply.

22.04 See Section 01 41 00 of the General Requirements for additional information.

ARTICLE 23—TAXES

23.01 The Bid shall include all taxes in effect at the time the Bid is submitted. No charge will be allowed for taxes from which OWNER is exempt. Bidders who are uncertain as to what items are subject to tax, or who require further explanation or clarification, are requested to contact the Illinois Department of Revenue. Refer to the Supplementary Conditions SC-7.10 for additional information.

ARTICLE 24—LAWS, ORDINANCES, AND REGULATIONS

24.01 Bidder must familiarize itself with all laws, ordinances, and regulations by federal, state, city, or other governmental agency, which by reason of being neglected or violated may affect the Work contemplated and must secure and pay the fee required for any permits which may be necessary unless such fees are otherwise indicated to be paid in the Bidding Documents.

ARTICLE 25—FUNDING

25.01 The Work described herein is being funded through the IEPA Public Water Supply Loan Program. Bidder shall review and comply with all requirements of the Public Water Supply Loan Program and, where applicable, shall be responsible for submitting required forms and/or certifications along with its Bid. Refer to the information inserted as part of the Bidding Documents entitled, "Procedures for Issuing Loans from the Public Water Supply Loan Program." See Section 00 49 60.6. Bidder shall include this entire packet with its Bid.

If the Bidder does not comply with the Public Water Supply Loan Program requirements or submit the necessary forms and/or certifications with its Bid, OWNER reserves the right to reject the Bid as nonresponsive.

25.02 Bidder shall complete the form inserted as part of the Bidding Documents entitled "Bidder's Certification In Compliance with Article 33E-11 to the Criminal Code of 2012" and submit it with the Bid. See Section 00 49 60.7.

25.03 Bidder shall complete the form inserted as part of the Bidding Documents titled "Non-Collusion and Certification Statement" and submit it with the Bid. See Section 00 45 19.

25.04 Bidder shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). Bidders shall complete the form inserted as part of the Bidding Documents entitled "Bidder Certification Regarding use of Iron, Steel, Manufactured Products, and Construction Materials Produced in the United States (Build America, Buy America Act)" And submit it with the Bid. See Section 00 49 60.

25.05 Bidder shall review and comply with the Davis-Bacon Wage Act Certification inserted as part of the Bidding Documents and submit the entire certification with its Bid. By submitting a bid, CONTRACTOR certifies that neither it nor any person or firm who has an interest in the CONTRACTOR's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of Davis-Bacon Act or 29-CFR5.12(a)(1). See Section 00 49 60.1.

25.06 Bidder shall comply with the President's Executive Order No. 11246, as amended. The requirements for Bidders under this order are explained in 41 CFR 60-4 and are included in the Bidding Documents. Bidder shall not discriminate on the basis of race, color, national origin or sex in the performance of this Contract. CONTRACTOR shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of Contracts awarded under EPA financial assistance agreements. Failure by CONTRACTOR to carry out these requirements is a material breach of this Contract which may result in the termination of this Contract or other legally available remedies. See Sections 00 49 60.2 and 00 49 60.4.

25.07 Bidder shall complete the form inserted as part of the Bidding Documents titled "U.S. Environmental Protection Agency Certification of Nonsegregated Facilities" and submit it with the Bid. See Section 00 49 60.3.

25.08 Bidder shall read the instructions and complete the form inserted as part of the Bidding Documents entitled "Certification Regarding Debarment, Suspension and Other Responsibility Matters" and submit it with the Bid. See Section 00 49 60.5.

25.09 Bidder shall review and comply with the specifications inserted as part of the Bidding Documents titled, "Specifications for Disadvantaged Business Enterprise Participation." Bidder shall also complete the appropriate form(s) based on compliance with the "Specifications for Disadvantaged Business Enterprise Participation." See Section 00 49 60.8.

25.10 Bidder shall review and comply with the requirements of the Illinois Works Jobs Program Act (30 ILCS 559/20), which have been inserted as part of the Bidding Documents titled "Illinois Works Jobs Program Act–Apprenticeship Initiative Information for Contractors." Bidder shall also complete the appropriate forms based on compliance with the Illinois Works Jobs Program Act (30 ILCS 559/20). See Section 00 49 60.9.

ARTICLE 26–EMPLOYMENT OF ILLINOIS WORKERS ON PUBLIC WORKS ACT, 30 ILCS 570

26.01 If at the time this Contract is executed, or if during the term of this Contract, there is excessive unemployment in Illinois as defined in the Employment of Illinois Worker on Public Works Act, 30 ILCS 570, as two consecutive months of unemployment exceeding 5%, CONTRACTOR agrees to employ a work force that consists of at least 90% Illinois laborers. An "Illinois laborer" is defined as any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident. The Bidder shall require all subcontractors (if any) to conform with said laws, and any rules or regulations now and thereafter issued to said laws by Bidder, his subcontractor, and/or anyone working through or on behalf of Bidder of Bidder's subcontractors.

26.02 Bidder shall complete the Employment of Illinois Workers on Public Works Act form confirming awareness of this requirement. See Section 00 49 60.10.

END OF SECTION

SECTION 00 41 00
BID
CITY OF CREST HILL
CREST HILL, ILLINOIS
EASTERN AND WESTERN RECEIVING STATIONS
CONTRACT 2-2025

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ARTICLE 1–BID RECIPIENT

1.01 Bids to be received until 2 P.M. local time, April 17, 2026.

1.02 Online electronic Bidding through QuestCDN.com is the only way the Bid will be accepted. To access the electronic Bid Form, download the Project documents and click the Online Bidding button.

1.03 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2–BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

2.01 Bid Acceptance Period

A. This Bid will remain subject to acceptance for 135 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

2.02 Instructions to Bidders

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

2.03 In submitting this Bid, Bidder represents the following:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the addenda.

2.04 Bidder will sign and deliver the required number of counterparts of the Agreement with the bonds, insurance certificates, and other documents required by the Bidding Requirements within 15 days after the date of OWNER's Notice of Award.

ARTICLE 3–BIDDER'S REPRESENTATIONS

3.01 Bidder's Representations

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as CONTRACTOR; and (c) Bidder's (CONTRACTOR's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4–BIDDER’S CERTIFICATIONS

4.01 Bidder certifies the following:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

C. Bidder has not solicited or induced any individual or entity to refrain from Bidding.

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the Bidding process.

2. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the Bidding process to the detriment of OWNER, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition.

3. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

4. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the Bidding process or affect the execution of the Contract.

E. Wages paid in connection with the Project shall be paid at prevailing rates not less than those prevailing under the Davis-Bacon Wage Act. Bidder further certifies that the provisions contained in the Section 00 49 60.1–Davis-Bacon Wage Act will be exercised in the performance of any Contract resulting from this Bid and are made a part of the Contract Documents thereto by their including in the Bid. See Section 00 49 60.1 for additional information.

ARTICLE 5–BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

The following abbreviations may be used in this Bid:

CIP	-	Complete in Place	LS	-	Lump Sum
CY	-	Cubic Yard	LT	-	Left
DI	-	Ductile Iron	MBF	-	Thousand Board Feet
DIA	-	Diameter	MFOB	-	Thousand Freight-On-Board
EA	-	Each	MH	-	Manhole
EST	-	Estimate(d)	RCP	-	Reinforced Concrete Pipe
EXCL	-	Excluding	RT	-	Right
FT	-	Feet	SF	-	Square Foot
GAL	-	Gallon	STA	-	Station
HERCP	-	Horizontal Elliptical RCP	SY	-	Square Yard
HRS	-	Hours	T	-	Ton
IN	-	Inch	VLF	-	Vertical Linear Foot
INCL	-	Including	W/	-	With
LBS	-	Pounds	W/O	-	Without
LF	-	Linear Foot			

BIDDERS SHOULD NOT ADD ANY CONDITIONS OR QUALIFYING STATEMENTS TO THIS BID OR THE BID MAY BE DECLARED IRREGULAR AS NOT BEING RESPONSIVE TO THE INSTRUCTIONS TO BIDDERS.

BID

CITY OF CREST HILL
CREST HILL, ILLINOIS
EASTERN AND WESTERN RECEIVING STATIONS
CONTRACT 2-2025

LUMP SUM BID:

_____ Dollars \$ _____
(Words) (Numbers)

See Section 01 29 00—Contract Considerations for discussion of Cash Allowances to include in the Bid.

Contract award will be made based on the Lump Sum Base Bid or Lump Sum Base Bid only. The price for all Base Bid Equipment items shall be included in the Lump Sum Base Bid. Bid Alternatives will be added or deducted from the Lump Sum Base Bid, if they are accepted, prior to Notice of Award being made.

OWNER reserves the right to accept or reject any Bid Alternatives or Alternative Equipment Manufacturers to the Lump Sum Base Bid. Should OWNER wish to consider Bid Alternatives listed, Bidder may be required to provide additional information as listed in Articles 7.05 and 7.06 of the General Conditions prior to Notice of Award. Consideration of Alternative Equipment Manufacturers of the selected Bidder will be made by OWNER within 60 days after the Effective Date of the Contract.

If a Bid Alternative is selected by OWNER, the awarded Contract price will include the selected Alternative(s).

BID ALTERNATIVES

BID ALTERNATIVE NO. 1:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of \$_____ shall be added to the Contract Lump Sum Base Bid if OWNER elects to have CONTRACTOR provide the system-wide telemetry and SCADA System improvements, as specified in Section 26 09 00—Controls and Instrumentation.

BID ALTERNATIVE NO. 2:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of \$_____ shall be added to the Contract Lump Sum Base Bid if OWNER elects to have CONTRACTOR provide power to the diversion structure, as shown on the Drawings.

EQUIPMENT ALTERNATIVES

CITY OF CREST HILL
CREST HILL, ILLINOIS
EASTERN AND WESTERN RECEIVING STATIONS
CONTRACT 2-2025

The name of the Base Bid Equipment Manufacturer, which Bidder shall include in the Lump Sum Base Bid, is listed for each equipment item. When more than one Base Bid Equipment Manufacturer name is listed for an item, Bidder shall circle the name of the equipment manufacturer selected for the Lump Sum Base Bid and write in the price for the selected equipment.

Where a Requested Alternative Equipment Manufacturer is listed in the Bid Form, Bidder shall include an add or deduct to the price of the Base Bid equipment that Bidder included in the Lump Sum Base Bid. The add or deduct price shall include the cost of any changes, including engineering changes, necessary to accommodate the alternative equipment including, but not limited to, process, structural, mechanical, and electrical work.

Where spaces are provided, Bidder may write in Other Alternative Equipment Manufacturers into the blank(s) provided on the Bid Form and include an add or deduct to the price of the Base Bid equipment that Bidder included in the Lump Sum Base Bid. The add or deduct price shall include the cost of the engineering services required for review of the alternative equipment in comparison to the Base Bid equipment and shall include the cost of any changes, including engineering changes, necessary to accommodate the alternative equipment including, but not limited to, process, structural, mechanical, and electrical work.

Whether or not an Alternative Equipment Manufacturer is offered to one or more Base Bid Equipment Manufacturers provided in the Bid Form, Bidder shall write (in numbers) the price for providing the Base Bid Equipment Manufacturer, as included in the Lump Sum Base Bid.

EQUIPMENT ALTERNATIVES

	Item	Base Bid Equipment Manufacturer Included in the Lump Sum Base Bid (Circle One)	Cost of Equipment Included in the Lump Sum Base Bid	Alternative Equipment Manufacturer	Add to Base Bid for Alternative Equipment Manufacturer	Deduct From Base Bid for Alternative Equipment Manufacturer
A.	Controls and Instrumentation (Section 26 09 00)	Energenecs OR Integrated Process Solutions OR Wunderlich-Malec	\$			(-) _____ (-) _____ (-) _____

BID

CITY OF CREST HILL CREST HILL, ILLINOIS EASTERN AND WESTERN RECEIVING STATIONS CONTRACT 2-2025

CASH ALLOWANCES

The following Cash Allowances shall be included in the Lump Sum Base Bid. The Cash Allowances for non-Lump Sum items shall be equal to the product of the quantity included in the Lump Sum Base Bid and the Unit Price. The will be adjusted in the event that estimated quantities to be included in the Lump Sum Base Bid are different from final measured quantities. A single Unit Price shall be bid for each item. Failure to include one or more of the following Unit Price items may result in rejection of the entire Bid as nonconforming. For items with a quantity of 1, the Cash Allowance shall be adjusted based on actual final costs.

Item Number	Description	Estimated Quantity Included in the Lump Sum Base Bid	Unit	Bid Unit Price	Total Bid Price Included in the Lump Sum Base Bid
1.	Office Furniture (Section 12 51 00–Office Furniture)	1	LS	\$15,000.00	\$15,000.00
2.	SCADA Computer (Section 26 09 00–Controls and Instrumentation)	1	LS	\$15,000.00	\$15,000.00
3.	Electric Service (Section 26 21 00–Electrical and Internet Service System)	1	LS	\$30,000.00	\$30,000.00
4.	Internet Service (Section 26 21 00–Electrical and Internet Service System)	1	LS	\$4,000.00	\$4,000.00
5.	Unsuitable Foundation Material for Structures and Roads (Section 31 23 00–Excavation, Fill, Backfill, and Grading)	100	CY	\$	\$
6.	Unsuitable Foundation Material for Utility Trenches (Section 31 23 00–Excavation, Fill, Backfill, and Grading)	100	CY	\$	\$
7.	Spare Parts for Pumps (Section 43 23 21.13–Centrifugal Pumps)	1	LS	\$1,000.00	\$1,000.00

ARTICLE 6–TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete within 670 calendar days after the date when the Contract Time commences to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 730 calendar days after the date when the Contract Time commences to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times.

ARTICLE 7–ATTACHMENTS TO THIS BID

7.01 The following documents are attached to and made a condition of this Bid:

- A. Required Bid security in the form of _____
(Certified Check, Bank Money Order, or Bond)
- B. Procedures for Issuing Loans from the Drinking Water Loan Program Rules.
- C. Bidder Certification Regarding Compliance with Criminal Code of 2012.
- D. Non-Collusion and Certification Statement.
- E. Bidder Certification Regarding the Use of Iron, Steel, Manufactured Products, and Construction Materials produced in the United States (Build America, Buy America Act).
- F. Davis-Bacon Prevailing Wage Requirements.
- G. Notice of Requirements For Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246).
- H. U.S. Environmental Protection Agency Certification of Nonsegregated Facility.
- I. Notice to Labor Unions or Other Organizations of Works Nondiscrimination in Employment.
- J. Certification Regarding Debarment, Suspension, and Other Responsibility Matters.
- K. Specifications for Disadvantaged Business Enterprise (DBE) Participation and Documentation of Compliance, including IEPA DBE Program Forms #1, #3, and 4.
- L. Illinois Works Jobs Programs Act-Apprenticeship Initiative Information for Contractors.
- M. Employment of Illinois Workers on Public Works Act.
- N. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license, if applicable, within the time for acceptance of Bids.

O. Where applicable, Bidder shall provide CONTRACTOR's License Number for the state of the Project, where noted at end of Bid or Bidder shall provide evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids.

ARTICLE 8-DEFINED TERMS

8.01 The terms used in this Bid with initial or all capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9-COMMUNICATIONS

9.01 Communications concerning this Bid shall be addressed to the address of Bidder indicated below:

Name: _____

Street: _____

City, State, Zip Code: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

ARTICLE 10-BID SUBMITTAL

Submitted on _____

State Contractor License Number _____(if applicable).

If Bidder is:

An Individual

By: _____
(Individual's signature)

Name (typed or printed): _____

Doing business as: _____

Business address: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

A Corporation

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Attest _____
(Signature of Corporate Secretary)

Business address: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

Date of Qualification to do business in (State where the Project is located) is _____

Sworn and subscribed to before me this
_____ day of _____, _____

Notary Public or Other Officer
Authorized to Administer Oaths.
My Commission expires: _____

A Limited Liability Company (Note: If member-managed, an authorized member must sign; if manager-managed, the authorized manager must sign. Attach evidence of authority to sign on behalf of LLC).

(Fill in complete name of LLC)

State of Formation: _____

By: _____
(Signature)

_____, [Member] [Manager]
(Print Name)

Business Address: _____

Telephone: _____

Email: _____

Fax: _____

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

Second Joint Venturer Name: _____

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

Phone No., Fax No., and postal and E-mail address for receipt of official communications:

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Sworn and subscribed to before me this
_____ day of _____, _____

Notary Public or Other Officer
Authorized to Administer Oaths.
My Commission expires: _____

END OF SECTION

10% BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

Bidder Name: [Full formal name of Bidder] Address (<i>principal place of business</i>): [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address (<i>principal place of business</i>): [Address of Owner's principal place of business]	Bid Project (<i>name and location</i>): [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due]
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
By: _____ (<i>Full formal name of Bidder</i>)	By: _____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
Name: _____ (<i>Signature</i>)	Name: _____ (<i>Signature</i>) (<i>Attach Power of</i>)
Title: _____ (<i>Printed or typed</i>)	Title: _____ (<i>Printed or typed</i>)
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

BIDDER'S CERTIFICATION

I, _____ (Individual having
been duly sworn on oath), do depose and state that I presently reside at
_____ (Address), and
that I am the duly authorized principal, officer or agent of
_____ (Name of CONTRACTOR) and do
hereby certify to OWNER, its Commissioners, officers and employees that neither I nor
_____ (Name of CONTRACTOR) are barred
from bidding on the contract for which this bid is being submitted, as a result of violation of either
Section 33E-3 ("Bid-rigging") or Section 33E-4 ("Bid-rotating") of Article 33E of the Criminal Code of
2012 of the State of Illinois, as amended.

(Individually and on behalf of CONTRACTOR)

Sworn and subscribed to before me this
_____ day of _____

Notary Public or Other Officer
Authorized to Administer Oaths.
My Commission expires: _____

NON-COLLUSION AND CERTIFICATION STATEMENT

1. By submission of the Bid, each Bidder and, in the case of a joint Bid, each party to the joint Bid certifies as to his or her own organization, that in connection with the Bid:

a. The prices in the Bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to the prices with any other bidder or with any competitor;

b. Unless otherwise required by law, the prices quoted in the Bid have not knowingly been directly or indirectly disclosed to any other bidder or to any competitor prior to Bid opening; and

c. No attempt has been made or will be made by the Bidder to induce any other person or firm to submit or withhold a Bid for the purpose of restricting competition. Also, each Bidder shall submit a certification regarding compliance with Article 33 E-11 of the Illinois Criminal Code of 2012 [720 ILCS 5/33 E-11]; and

2. Each person signing the Bid shall certify that (check one):

--- He/she is the person in the Bidder's organization responsible for the decision as to the prices being bid and that he/she has not participated, and will not participate, in any action contrary to 1.a. through 1.c.; or

--- He/she is not the person in the Bidder's organization responsible for the decision as to the prices being bid but that he/she has been authorized to act as agent certifying that the persons determining the prices have not participated, and will not participate, in any action contrary to 1.a. through 1.c., and as their agent shall so certify. He/She shall also certify that he/she has not participated, and will not participate, in any action contrary to 1.a. through 1.c.

Signature of Authorized Representative

Date

Typed Name and Title of Authorized Representative

Sworn and subscribed to before me this _____ day of _____

Notary Public or Other Officer
Authorized to Administer Oaths.
My Commission expires: _____

**Bidder Certification Regarding the Use of
Iron, Steel, Manufactured Products, and Construction Materials produced in the United States
(Build America, Buy America Act)**

I _____, do hereby certify that:

Name

1. I am _____ (title) of the _____ (company, partnership, etc.) and have authority to execute this certification on behalf of the firm.
2. I am aware that all iron, steel, manufactured products, and construction materials used for this project must be produced in the United States per the federal Build America, Buy America Act (BABA) signed by President Biden on November 15, 2021. Pub. L No. 117-58, §§ 70901-52.
3. I understand the term “iron and steel products” refers to the following products made primarily of iron or steel: lined or unlined pipes and fittings manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
4. I understand that all manufactured products used in the project must be produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.
5. I acknowledge that all construction materials for this project must be manufactured in the United States. This means all manufacturing processes for the construction materials occurred in the United States.
6. I am aware that this requirement applies to all portions of the project that are subcontracted.

Signature _____

Date _____

Corporate Seal (where appropriate)

Requirements Specific to Buy America, Build America Act (BABA)

On November 15, 2021, President Biden signed into law the Infrastructure Investment and Jobs Act (“IIJA”), Pub. L. No. 117-58, which includes the Build America, Buy America Act (“BABA”). The purpose of BABA is to ensure that federally funded infrastructure projects only utilize iron, steel, manufactured products, and construction materials produced in the United States. The requirement to use products produced in the United States applies to all projects for the construction, alteration, maintenance, or repair of publicly owned treatment works (POTW) or public water systems. Since Illinois’ Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) utilize federal funds, loan recipients must use iron, steel, manufactured products, and construction materials that are produced in the United States. Guidance is available on USEPA’s website: <https://www.epa.gov/cwsrf/build-america-buy-america-baba>. Waivers from the requirements are available under certain circumstances. BABA requires the following:

1. All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
2. All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation.
3. All construction materials are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

BABA only applies to items that are consumed in, incorporated into, or affixed to an infrastructure project. It does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at project completion. BABA does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of or permanently affixed to the structure.

BABA requirements apply to an entire infrastructure project, even if it is funded by both Federal and non-Federal funds under one or more awards.

Construction Materials includes an article, material, or supply that consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products including polyvinylchloride, composite building materials, and polymers used in fiber optic cables;
- glass including optic glass;
- lumber; or
- drywall.

Construction Materials does NOT include items made primarily of iron or steel; manufactured products; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

Requirements Specific to Iron and Steel

The existing American Iron and Steel (AIS) Requirements will continue as part of BABA. An iron or steel product is one of the items listed below and is made primarily of iron or steel that is permanently incorporated into the public water system or treatment works.

- Pipes (lined or unlined) and pipe fittings
- Pipe clamps and restraints
- Valves
- Structural steel
- Manhole Covers and other municipal castings such as valves boxes, drainage grates, bollards, etc.
- Construction materials such as trusses, wire, grating, wire, ductwork, fence tubing, wall panels, etc.
- Hydrants
- Flanges
- Tanks
- Reinforced precast concrete

For one of the listed iron or steel products to be considered subject to the BABA requirements, it must be made of greater than 50% iron or steel, measured by the material costs. “Steel” means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels. AIS Guidance is available at: <https://epa.illinois.gov/topics/grants-loans/state-revolving-fund/guidance/american-iron-and-steel-requirements.html> .

Recordkeeping and Documenting the Country of Origin for Iron, Steel, Manufactured Products, & Construction Materials used in Loan Funded Projects

Loan recipients with assistance from their general contractor must be able to verify that products used in their projects comply with the BABA requirements. USEPA recommends loan recipients use a “Step Certification” process to ensure that producers adhere to the BABA requirements. Step certification is a process under which each handler (supplier, fabricator, manufacturer, etc.) of the iron, steel, manufactured products, or construction materials certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin.

A certification can be quite simple if it includes the name of the manufacturer, the location of the manufacturing facility (not company headquarters), a description of the product or item being delivered, and a signature by a manufacturer’s responsible party. Certification could be achieved by other methods such as requiring the final manufacturer, who delivers the products to the worksite, to provide certification that all manufacturing processes occurred in the US. While this type of certification is easier and acceptable, it may not provide the same degree of assurance and additional documentation may be needed.

USEPA auditors recommend keeping records of when and where the products were delivered. Records from the manufacturer should refer to specific items such as pipes, valves, meters. Try to avoid records containing broad statements such as, “All products delivered were USA made”.

Regardless of the method, documents regarding the country of origin for all covered items should be collected and maintained by the loan recipients. Having a good paper trail is invaluable during an inspection or audit.

Sample Certification Letter

Below is a sample step certification letter for BABA compliance. The completed letter is provided to the construction contractor or loan applicant by the supplier, fabricator, manufacturer, etc. of covered products. Documentation must be provided on company letterhead.

Company Letterhead	
Date	
Company Name	
Company Address	
City, State, Zip	
Subject: Build America, Buy America Act Step Certification for Project (Identify Project Here xxx)	
I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project are in full compliance with the federal Build America, Buy America Act requirements as required in EPA’s State Revolving Fund Programs.	
Item, Products, and/or Materials:	
1.	XXX
2.	XXX
3.	XXX
Such process took place at the following location (City and State must be included):	
If any of the above compliance statements change while providing material for this project, we will immediately notify the prime contractor and the engineer.	
Signed by Company Representative	
Name Clearly Typed	

BIDDER certifies that wages paid in connection with the PROJECT shall be paid at prevailing rates not less than those prevailing under the Davis-Bacon Wage Act. Bidder further certifies that the provisions contained in the following clauses will be exercised in the performance of any contract resulting from this BID and are made a part of the CONTRACT DOCUMENTS thereto by their inclusion in the BID as follows:

(1) *Minimum wages.*

- (i) All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, <http://beta.sam.gov/>
- (ii) (A) The sub-recipient, on behalf of USEPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The USEPA award official shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (2) The classification is utilized in the area by the construction industry; and
 - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub-recipient agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the sub-recipient to IEPA. IEPA shall forward the report to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC

20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise IEPA or will notify IEPA within the 30-day period that additional time is necessary.

(C) In the even the contractor, the laborers, or mechanics to be employed in the classification or their representatives, and the sub-recipient do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), IEPA shall refer the questions, including the views of all interested parties and the recommendation of the sub-recipient, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise IEPA or will notify IEPA within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis Bacon Act have been met. The Secretary of Labor may require the contractor to set aside, in a separate account, assets for the meeting of obligations under the plan or program.
- (2) *Withholding.* The sub-recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the sub-recipient may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.
- (3) *Payrolls and basic records.*
- (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid.

Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

- (ii) (A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the sub-recipient. Such documentation shall be available upon request of IEPA or USEPA. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Website, [\[https://www.dol.gov/whd/forms/index.htm\]](https://www.dol.gov/whd/forms/index.htm). The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the sub-recipient, for transmission to the IEPA, USEPA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub-recipient.
- (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
 - (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

- (D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of IEPA, USEPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees*

- (i) *Apprentices.* Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid no less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) *Trainees.* Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by form certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- (5) *Compliance with Copeland Act requirements.* The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the USEPA may by appropriate instruction require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- (7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) *Compliance with Davis Bacon and Related Act requirements.* All rulings and interpretations of the Davis Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6,

and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.*

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements in prescribed in the U.S. Criminal Code, 18 U.S.C. 1001

Contract Provision for Contracts in Excess of \$100,000 - clauses (1) through (4) shall be inserted in full in any contract in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act.

Contract Work Hours and Safety Standards Act

- (1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanics receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanics, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
- (3) *Withholding for unpaid wages and liquidated damages.* The sub-recipient, shall upon its own action or upon written request of the USEPA award official or an authorized representative of the Department of Labor, withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

- (4) *Subcontracts*. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

The following shall be inserted into any contract subject only to the Contract Work Hours and Safety Standards Act.

The contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the USEPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

*******Insert applicable current Davis-Bacon Wage Rates Here*******

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL
EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246)**

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for minority participation for each trade	Goals for female participation in each trade
	Insert goals for* each year _____	Insert goals for* each year _____

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.
4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is **.

*goals and timetables published from time to time by the Director, Office of Federal Contract Compliance Programs (OFCCP)

**Insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any.

**CONSTRUCTION CONTRACTORS AFFIRMATIVE ACTION REQUIREMENTS
GOALS FOR MINORITY PARTICIPATION**

(As published in the Friday, October 3, 1980 Federal Register)

FEMALE PARTICIPATION= 6.9% STATEWIDE

<u>County</u>	<u>Percent</u>	<u>County</u>	<u>Percent</u>	<u>County</u>	<u>Percent</u>
Adams	3.1	Jasper	11.4	Randolph	11.4
Alexander	11.4	Jefferson	11.4	Richland	11.4
Bond	11.4	Jersey	11.4	Rock Island	4.6
Boone	6.3	Jo Davis	0.5	Saline	3.5
Brown	3.1	Johnson	11.4	Sangamon	4.5
Bureau	18.4	Kane	19.6	Schuyler	3.3
Calhoun	11.4	Kankakee	9.1	Scott	4
Carroll	3.4	Kendall	18.4	Shelby	4
Cass	4	Knox	3.3	Stark	3.3
Champaign	7.8	Lake	19.6	St. Clair	14.7
Christian	4	La Salle	18.4	Stephenson	4.6
Clark	2.5	Lawrence	3.5	Tazwell	4.4
Clay	11.4	Lee	4.6	Union	11.4
Clinton	14.7	Livingston	18.4	Vermilion	4.8
Coles	4.8	Logan	4	Wabash	3.5
Cook	19.6	Macon	7.6	Warren	3.3
Crawford	2.5	Macoupin	11.4	Washington	11.4
Cumberland	4.8	Madison	14.7	Wayne	11.4
De Kalb	18.4	Marion	11.4	White	3.5
De Witt	4	Marshall	3.3	Whiteside	3.4
Douglas	4.8	Mason	3.3	Will	20.9
Du Page	19.6	Massac	5.2	Williamson	11.4
Edgar	4.8	McDonough	3.3	Winnebago	6.3
Edwards	3.5	McHenry	19.6	Woodford	4.4
Effingham	11.4	McLean	2.5		
Fayette	11.4	Menard	4.5		
Ford	4.8	Mercer	3.4		
Franklin	11.4	Monroe	14.7		
Fulton	3.3	Montgomery	11.4		
Gallatin	3.5	Morgan	4		
Greene	11.4	Moultrie	4		
Grundy	18.4	Ogle	4.6		
Hamilton	3.5	Peoria	4.4		
Hancock	3.4	Perry	11.4		
Hardin	5.2	Piatt	4.8		
Henderson	3.4	Pike	3.1		
Henry	4.6	Pope	5.2		
Iroquois	18.4	Pulaski	11.4		
Jackson	11.4	Putnam	18.4		

41 CFR 60

60-4.1 Scope and Application.

This part applies to all contractors and subcontractors that hold any Federal or federally assisted construction contract in excess of \$10,000. The regulations in this part are applicable to all of a construction contractor's or subcontractor's construction employees who are engaged in on site construction including those construction employees who work on a non-Federal or non-federally assisted construction site. This part also establishes procedures, which all Federal contracting officers and all applicants, as applicable, shall follow in soliciting for and awarding Federal or federally assisted construction contracts. Procedures also are established which administering agencies shall follow in making any grant, contract, loan, insurance, or guarantee involving federally assisted construction which is not exempt from the requirements of Executive Order 11246, as amended. In addition, this part applies to construction work performed by construction contractors and subcontractors for Federal non-construction contractors and subcontractors if the construction work is necessary in whole or in part to the performance of a non-construction contract or subcontract.

[43 FR 49254, OCT. 20, 1978; 43 FR 51404, NOV. 3, 1978]

60-4.2 Solicitations.

(a) All Federal contracting officers and all applicants shall include the notice set forth in paragraph (d) of this section and the Standard Federal Equal Employment Opportunity Construction Contract Specifications set forth in § 60-4.3 of this part in all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of the part. Administering agencies shall require the inclusion of the notice set forth in paragraph (d) of this section and the specifications set forth in § 60-4.3 of this part as a condition of any grant, contract, subcontract, loan, insurance or guarantee involving federally assisted construction covered by this Part 60-4.

(b) All non-construction contractors covered by Executive Order 11246 and the implementing regulations shall include the notice in paragraph (d) of this section in all construction agreements, which are necessary in whole or in part to the performance of the covered non-construction contract.

(c) Contracting officers, applicants and non-construction contractors shall give written notice to the Director within 10 working days of award of a contract subject to these provisions. The notification shall include the name, address, and telephone number of the contractor; employer identification number; dollar amount of the contract, estimated starting and completion dates of the contract; the contract number; and geographical area in which the contract is to be performed.

(d) The following notice shall be included in, and shall be a part of, all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of this part (see 41 CFR 60-4.2(a)):

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Time- tables	Goals for minority participation for each trade	Goals for female participation in each trade
	Insert goals for each year.	Insert goals for each year.

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any).

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978, AS AMENDED AT 45 FR 65977, OCT. 3, 1980]

60-4.3 Equal Opportunity Clauses.

(a) The equal opportunity clause published at 41 CFR 60-1.4(a) of this chapter is required to be included in, and is part of, all nonexempt Federal contracts and subcontracts, including construction contracts and subcontracts. The equal opportunity clause published at 41 CFR 60-1.4(b) is required to be included in, and is a part of, all nonexempt federally assisted construction contracts and subcontracts. In addition to the clauses described above, all Federal contracting officers, all applicants and all non-construction contractors, as applicable, shall include the specifications set forth in this section in all Federal and federally assisted construction contracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of this part and in construction subcontracts in excess of \$10,000 necessary in whole or in part to the performance of non-construction Federal contracts and subcontracts covered under the Executive order.

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:

a. "Covered area," means the geographical area described in the solicitation from which this contract resulted:

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, nor the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, the Contractor must employ such apprentices and trainees during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason; therefore, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the

program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws, which establish different standards of compliance or upon the application of requirements for the

hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(b) The notice set forth in 41 CFR 60-4.2 and the specifications set forth in 41 CFR 60-4.3 replace the New Form for Federal Equal Employment Opportunity Bid Conditions for Federal and Federally Assisted Construction published at 41 FR 32482 and commonly known as the Model Federal EEO Bid Conditions, and the New Form shall not be used after the regulations in 41 CFR Part 60-4 become effective.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978, AS AMENDED AT 45 FR 65978, OCT. 3, 1980]

60-4.4 Affirmative Action Requirements.

(a) To implement the affirmative action requirements of Executive Order 11246 in the construction industry, the Office of Federal Contract Compliance Programs previously has approved affirmative action programs commonly referred to as "Hometown Plans," has promulgated affirmative action plans referred to as "Imposed Plans" and has approved "Special Bid Conditions" for high impact projects constructed in areas not covered by a Hometown or an Imposed Plan. All solicitations for construction contracts made after the effective date of the regulations in this part shall include the notice specified in § 60-4.2 of this part and the specifications in § 60-4.3 of this part in lieu of the Hometown and Imposed Plans including the Philadelphia Plan and Special Bid Conditions. Until the Director has issued an order pursuant to § 60-4.6 of this part establishing goals and timetables for minorities in the appropriate geographical areas or for a project covered by Special Bid Conditions, the goals and timetables for minorities to be inserted in the Notice required by 41 CFR 60-4.2 shall be the goals and timetables contained in the Hometown Plan, Imposed Plan or Special Bid Conditions presently covering the respective geographical area or project involved.

(b) Signatories to a Hometown Plan (including heavy highway affirmative action plans) shall have 45 days from the effective date of the regulations in this part to submit under such a Plan (for the director's approval) goals and timetables for women and to include female representation on the Hometown Plan Administrative Committee. Such goals for female representation shall be at least as high as the goals established for female representation in the notice issued pursuant to 41 CFR 60-4.6. Failure of the signatories, within the 45-day period, to include female representation and to submit goals for women or a new plan, as appropriate, shall result in an automatic termination of the Office of Federal Contract Compliance Program's approval of the Hometown Plan. At any time, the Office of Federal Contract Compliance Programs terminates or withdraws its approval of a Hometown Plan, or when the plan expires and another plan is not approved, the contractors signatory to the plan shall be covered automatically by the specifications set forth in § 60-4.3 of this part and by the goals and timetables established for that geographical area pursuant to § 60-4.6 of this part.

60-4.5 Hometown Plans

(a) A contractor participating, either individually or through an association, in an approved Hometown Plan (including heavy highway affirmative action plans) shall comply with its

affirmative action obligations under Executive Order 11246 by complying with its obligations under the plan: *Provided*, That each contractor or subcontractor participating in an approved plan is individually required to comply with the equal opportunity clause set forth in 41 CFR 60-1.4; to make a good faith effort to achieve the goals for each trade participating in the plan in which it has employees; and that the overall good performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan's goals and timetables. If a contractor is not participating in an approved Hometown Plan it shall comply with the specifications set forth in § 60-4.3 of this part and with the goals and timetables for the appropriate area as listed in the notice required by 41 CFR 60-4.2 with regard to that trade. For the purposes of this part 60-4, a contractor is not participating in a Hometown Plan for a particular trade if it:

- (1) Ceases to be signatory to a Hometown Plan covering that trade;
 - (2) Is signatory to a Hometown Plan for that trade but is not party to a collective bargaining agreement for that trade;
 - (3) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with labor organizations, which are not or cease to be signatories to the same Hometown Plan for that trade;
 - (4) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with a labor organization for that trade but the two have not jointly executed a specific commitment to minority and female goals and timetables and incorporated the commitment in the Hometown Plan for that trade;
 - (5) Is participating in a Hometown Plan for that trade which is no longer acceptable to the Office of Federal Contract Compliance Programs;
 - (6) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with a labor organization for that trade and the labor organization and the contractor have failed to make a good faith effort to comply with their obligations under the Hometown Plan for that trade.
- (b) Contractors participating in Hometown Plans must be able to demonstrate their participation and document their compliance with the provision of the Hometown Plan.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978]

60-4.6 Goals and Timetables.

The Director, from time to time, shall issue goals and timetables for minority and female utilization, which shall be based on appropriate workforce, demographic, or other relevant data and which shall cover construction projects or construction contracts performed in specific geographical areas. The goals, which shall be applicable to each construction trade in a covered contractor's or subcontractor's entire workforce which is working in the area covered by the goals and timetables, shall be published as notices in the Federal Register, and shall be inserted by the contracting officers and applicants, as applicable, in the Notice required by 41 CFR 60-4.2.

Covered construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed.

[45 FR 65978, OCT. 3, 1980]

60-4.7 Effect on Other Regulations.

The regulations in this part are in addition to the regulations contained in this chapter, which apply to construction contractors and subcontractors generally. See particularly, 41 CFR 60-1.4 (a), (b), (c), (d), and (e); 60-1.5; 60-1.7; 60-1.8; 60-1.26; 60-1.29; 60-1.30; 60-1.32; 60-1.41; 60-1.42; 60-1.43; and 41 CFR Part 60-3; Part 60-20; Part 60-30; Part 60-40; and Part 60-50.

60-4.8 Show Cause Notice.

If an investigation or compliance review reveals that a construction contractor or subcontractor has violated the Executive order, any contract clause, specifications or the regulations in this chapter and if administrative enforcement is contemplated, the Director shall issue to the contractor or subcontractor a notice to show cause which shall contain the items specified in paragraphs (i) through (iv) of 41 CFR 60-2.2(c)(1). If the contractor does not show good cause within 30 days, or in the alternative, fails to enter an acceptable conciliation agreement which includes where appropriate, make up goals and timetables, back pay, and seniority relief for affected class members, the OFCCP shall follow the procedure in 41 CFR 60-1.26(b): *Provided*, That where a conciliation agreement has been violated, no show cause notice is required prior to the initiation of enforcement proceedings.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978]

60-4.9 Incorporation by Operation of the Order.

By operation of the order, the equal opportunity clause contained in § 60-1.4, the Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246) contained in § 60-4.2, and the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246) contained in § 60-4.3 shall be deemed to be a part of every solicitation or of every contract and subcontract, as appropriate, required by the order and the regulations in this chapter to include such clauses whether or not they are physically incorporated in such solicitation or contract and whether or not the contract is written.

U.S. ENVIRONMENTAL PROTECTION AGENCY

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000 that are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated based on race, creed, color, or national origin, because of habit, local custom or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certification in his files.

Signature

Date

Name and Title of Signer

(Please type)

Firm Name

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS

NONDISCRIMINATION IN EMPLOYMENT

To: _____
(Name of union or organization of workers)

The undersigned currently holds contract(s) with _____
(name of applicant)

involving funds or credit of the U.S. Government or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and in accordance with Executive Order 11246, as amended, dated September 24, 1965, as amended, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

HIRING, PLACEMENT, UPGRADING, TRANSFER OR DEMOTION, RECRUITMENT,
ADVERTISING, OR SOLICITATION FOR EMPLOYMENT, TRAINING DURING
EMPLOYMENT, RATES OF PAY OR OTHER FORMS OF COMPENSATION, SELECTION FOR
TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR TERMINATION.

This notice is furnished you pursuant to the provisions of the above contract(s) or subcontracts(s) and Executive Order 11246, as amended.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

(Contractor or Subcontractor)

(Date)

EPA Project Control #: _____

United States Environmental Protection Agency
Washington, DC 20460

Certification Regarding Debarment, Suspension and Other Responsibility Matters

The prospective participant to the best of its knowledge and belief that it and its principles:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in fine of up to \$10,000 or imprisonment for up to 5 years, or both.

(Typed Name & Title of Authorized Representative)

(Signature of Authorized Representative)

(Date)

☐ I am unable to certify the above statements. My explanation is attached.

EPA FORM 5700-49 (11-88)

Instructions

Under Executive Order 12549 an individual or organization debarred or excluded from participation in Federal assistance or benefit programs may not receive any assistance award under a Federal program, or a sub-agreement thereunder for \$25,000 or more.

Accordingly, each prospective recipient of an EPA grant, loan, or cooperative agreement and any contract or sub-agreement participant thereunder must complete the attached certification or provide an explanation why they cannot. For further details, see 40 CFR 32.510, Participants' responsibilities, in the attached regulation.

Where to Submit

The prospective EPA grant, loan, or cooperative agreement recipient must return the signed certification or explanation with its application to the appropriate EPA Headquarters or Regional office, as required in the application instructions.

A prospective prime contractor must submit a completed certification or explanation to the individual or organization awarding the contract.

Each prospective subcontractor must submit a completed certification or explanation to the prime contractor for the project.

How to Obtain Forms:

EPA includes the certification form, instructions, and a copy of its implementing regulation (40 CFR Part 32) in each application kit. Applicants may reproduce these materials as needed and provide them to their prospective prime contractor, who, in turn, may reproduce and provide them to prospective subcontractors.

Additional copies/assistance may be requested from:

Compliance Branch
Grants Administration Division (PM-216F)
U.S. Environmental Protection Agency
401 M Street, SW
Washington DC 20460
(Telephone: 202-475-8025)

EPA Form 5700-19 (11-88)

**Construction Contracts of Loan Recipient and Other Sections From
"Procedures for Issuing Loans from the Public Water Supply Loan Program"**

Section 662.420(b)(2) Change Orders

- A) When the loan recipient authorizes the contractor to add, delete, or revise the work within the general scope of the contract documents, or authorizes an adjustment in the contract price or contract time, the loan recipient shall submit a change order to the Agency.
- B) For each change order, the loan recipient shall submit to the Agency for approval the following documentation:
 - i) one copy of the fully executed change order signed by the loan recipient, construction engineer, and the contractor; and
 - ii) a description of any changes, with justification for the changes.
- C) Prior approval by the Agency of a change order is required when a change order results in:
 - i) alterations in design scope that require a modification to a construction permit; or
 - ii) an increase in the amount of loan funds needed to complete the project.
- D) Failure to give timely notice of proposed project changes or action by the loan recipient that is not consistent with the Agency's determination on those changes may result in disallowance of loan participation for costs incurred that are attributable to the change.

Section 662.620(f) Required Construction Contract Provisions

Each construction contract shall include the following provisions:

- 1) Audit; access to records:
 - A) The contractor shall maintain books, records, documents and other evidence directly pertinent to performance on loan work in accordance with Generally Accepted Accounting Principles (GAAP). The contractor shall also maintain the financial information and data used by the contractor in the preparation or support of any cost submissions required under Section 365.420 (b)(2) of the loan rules and a copy of the cost summary submitted to the owner. The Illinois Auditor General, the owner, the Agency, or any of their authorized representatives shall have access to the books, records, papers, documents, and other evidence for purposes of inspection, audit, examination, excerpts, transcriptions, and copying. The contractor shall provide facilities for access and inspection.
 - B) For a formally advertised, competitively awarded, fixed price contract, the contractor shall include access to records as required by subsection (a)(1)(A) for all negotiated change orders and contract amendments in excess of \$25,000 that affect the contract

price. In the case of all other prime contracts, the contractor shall agree to include access to records required by subsection (a)(1)(A) in all contracts and all tier subcontracts or change orders in excess of \$25,000 that are directly related to project performance.

- C) Audits shall be in accordance with auditing standards generally accepted in the United States.
- D) The contractor shall agree to the disclosure of all information and reports resulting from access to records required by subsection (a)(1)(A). When the audit concerns the contractor, the auditing agency shall afford the contractor an opportunity for an audit exit conference and an opportunity to comment on the pertinent portions of the draft audit report. The final audit report shall include the written comments, if any, of the audited parties.
- E) The records required by subsection (a)(1)(A) shall be maintained and made available during performance of the work under the loan agreement and for 3 years after the date of the final loan audit. In addition, records that relate to any dispute or litigation or the settlement of claims arising out of any performance, costs or items to which an audit exception has been taken, shall be maintained and made available for 3 years after resolution of the dispute, appeal, litigation, claim or exception.
- F) The right of access will generally be exercised with respect to financial records under:
 - i) Negotiated prime contracts;
 - ii) Negotiated change orders or contract amendments in excess of \$25,000 affecting the price of any formally advertised, competitively awarded, fixed price contract; and
 - iii) Subcontracts or purchase orders under any contract other than a formally advertised, competitively awarded, fixed price contract.
- G) The right of access will generally not be exercised with respect to a prime contract, subcontract, or purchase order awarded after effective price competition. In any event, the right of access shall be exercised under any type of contract or subcontract:
 - i) With respect to records pertaining directly to contract performance, excluding any financial records of the contractor; and
 - ii) If there is any indication that fraud, gross abuse, or corrupt practices may be involved in the award or performance of the contract or subcontract.

2) Covenant against contingent fees.

The contractor shall warrant that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warranty, the owner shall have the right to annul the contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

3) Wage provisions.

The Contractor shall pay prevailing wages in accordance with the Davis-Bacon Act (40 USC 3141 through 3148) as defined by the U.S. Department of Labor.

4) Disadvantaged business enterprise requirements.

The contractor shall provide evidence that the contractor has taken affirmative steps in accordance with 40 CFR 33 to assure that disadvantaged business enterprises are used when possible as sources of supplies, equipment, construction, and services, consistent with the provisions of the Agency's Operating Agreement with USEPA.

5) Debarment and suspension provisions.

The contract shall require the successful bidders to submit a Certificate Regarding Debarment, Suspension and Other Responsibility Matters (EPA Form 5700-49) showing compliance with federal Executive Order 12549.

6) Nonsegregated facilities provisions

The contractor shall be required to submit a Certification of Nonsegregated Facilities on forms provided by the Agency.

7) American Iron and Steel

The contractor shall be required to use American Iron and Steel, if required by USEPA for that fiscal year.

8) A clause that provides:

"No contractor or subcontractor shall discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor or subcontractor shall carry out applicable requirements of 40 CFR 33 in the award and administration of contracts awarded under the PWSLP. Failure by the contractor or subcontractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies."

Section 662.620(g) Subcontracts Under Construction Contracts

The award or execution of all subcontracts by a prime contractor and the procurement and negotiation procedures used by the prime contractor shall comply with:

- 1) All applicable provisions of federal, State and local law;
- 2) All provisions of this Part 662 regarding fraud and other unlawful or corrupt practices;
- 3) All provisions of this Part 662 with respect to access to facilities, records and audit of records; and
- 4) All provisions of subsection 662.620(f)(5) that require a Certification Regarding Debarment, Suspension, and Other Responsibility Matters (EPA Form 5700-49) showing compliance with any controlling federal Executive Orders.

Section 662.620(h) Contractor Bankruptcy

In the event of a contractor bankruptcy, the loan recipient shall notify the Agency and shall keep the Agency advised of any negotiations with the bonding company, including any proposed settlement. The Agency may participate in those negotiations and will advise the loan recipient of the impact of any proposed settlement to the loan agreement. The loan recipient shall be responsible for assuring that every appropriate procedure and incidental legal requirement is observed in advertising for bids and re-awarding a construction contract.

Section 662.620(i) Access

Every contract entered by the loan recipient for construction work, and every subagreement, shall provide the Agency representatives with access to the work. The contractor or subcontractor shall provide facilities for such access and inspection.

Section 662.640(c) Remedies

All claims, counter-claims, disputes and other matters in question between the recipient and the contractor arising out of, or relating to, a subagreement or its breach shall be decided by arbitration if the parties agree, or in a court of competent jurisdiction within the State.

Specifications for Disadvantaged Business Enterprise Participation

(Name of Loan Recipient) _____

I. Disadvantaged Business Enterprise Policy

- A. It is the policy of the State of Illinois to award a fair share of sub-agreements to disadvantaged businesses (DBEs). In complying with this requirement, contractors are required to take affirmative steps to assure that disadvantaged businesses are used when possible as sources of supplies, equipment, construction, and services as explained herein.
- B. These specifications define the terms, conditions, and requirements of the State Revolving Fund Loan Program, and the (Name of Loan Recipient) _____'s policy and procedures for complying with these requirements.
- C. As required by the award conditions of USEPA's Assistance Agreement with IEPA, the fair share percentages are 5% for MBEs and 12% for WBEs.

II. Pre-Contract Award Obligations

- A. All bidders are required to advertise subcontracting opportunities and to negotiate with disadvantaged businesses prior to bid opening. Failure to document such affirmative efforts shall be deemed, relative to disadvantaged business compliance, non-responsive.
- B. To establish a bid as responsible, the bidder will be required to document the proposed utilization of disadvantaged businesses with letters of intent signed by the bidder and by the disadvantaged business listed in the bid. The documentation requirements are outlined in Section III of this document.
- C. (Name of Loan Recipient) _____'s disadvantaged business policy clearly intends for bidders to contact and encourage the participation of disadvantaged businesses prior to bid opening. Affirmative efforts (the written record of conscientious and honest communications between the bidder and disadvantaged business) must be initiated and completed by the bidder prior to bid opening. All bidders must document compliance with the requirements of the disadvantaged business policy.

III. Evaluation of Disadvantaged Business Utilization and Affirmative Efforts

- A. As a prerequisite to demonstrate compliance with the (Name of Loan Recipient) _____'s disadvantaged business policy, ALL bidders shall provide the following with its bid:

- 1. Completed and signed certification from the bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services, in the performance of this contract.

OR

- 2. "Certification of publication," or adequate proof of publication, including an actual copy of the newspaper advertisement from a daily newspaper. **The**

advertisement must run one day at least (16) days prior to bid opening. An example advertisement follows this section.

Bidders may publish the advertisement in an established, online bidder's clearinghouse such as the "Dodge Report (<http://construction.com/dodge/>)". If an online advertisement is placed with the "Dodge Report" or an equivalent website, a screenshot of the advertisement along with the webpage address, and a payment receipt is required as documentation. **The advertisement must run one day at least (16) days prior to bid opening.**

3. List of all disadvantaged business enterprise (DBE) and non-DBE's that submitted proposals to the bidder along with the date of the proposal. Names, addresses, phone number and/or e-mail are required.
4. List of disadvantaged businesses not being utilized and justification for non-utilization.
5. If DBE subcontractors will be utilized for the project, a completed and signed copy of IEPA DBE Form No. 3 (DBE Subcontractor Utilization Form) or an equivalent "Notice of Intent" is needed from each subcontractor.
6. If DBE subcontractors will be utilized for the project, a completed and signed certification from the bidder(s), attesting that the bidder has no controlling or dominating interest or conflict of interest with the disadvantaged business that will be utilized.
7. In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received.

Failure to submit the documentation pursuant to the requirements of A (1-7) above may cause rejection of the bid as non-responsive.

IV. Sanctions

- A. The (Name of Loan Recipient) _____ has the option to reject one or all bids when the information submitted by the bidder(s) fails to demonstrate compliance with the disadvantaged business requirements (i.e., the bidder fails to place their pre-bid advertisement in a daily newspaper, or approved website, at least 16 days prior to bid opening).
- B. Upon finding that any Party has not complied with the requirements of these specifications, including misrepresenting a firm as a disadvantaged business, any one or a combination of the following actions may be taken.
 1. Declare the bidder and/or subcontractor non-responsive and therefore, ineligible for contract award.
 2. Disallow all contract costs associated with non-compliance.
 3. Refer matters which may be fraudulent to the Illinois Attorney General.

V. Post-Contract Award Compliance

- A. As required by the award conditions of USEPA's Assistance Agreement with IEPA, all sub-agreements of the prime contractor must identify that the fair share percentages are 5% for MBEs and 12 % for WBEs.
- B. After award of the prime contract, copies of all disadvantaged business-related sub-agreements between the prime contractor and subcontractors shall be submitted to the owner.
- C. After bid submission, any changes in previously reported disadvantaged businesses utilization shall be handled in accordance with 40 CFR Part 33.302(b-h). If the contractor fails to initiate such actions, the owner may withhold payments and/or institute other appropriate sanctions.

**SUGGESTED DISADVANTAGED BUSINESS (DBE)
ADVERTISEMENT FOR CONSTRUCTION CONTRACTORS**

Notice to Disadvantaged Businesses

_____, _____, _____, is
(Name of Company) (Address of Company) (Telephone)

seeking disadvantaged businesses for the _____
(Name of Loan Recipient)

Project for subcontracting opportunities in the following areas: _____,
_____, _____

All disadvantaged businesses should contact, IN WRITING, (certified letter, return receipt requested),
_____ to discuss the subcontracting opportunities. All negotiations must
(Company Contact Person)

be completed prior to bid opening _____.
(Date of Bid Opening)

*The advertisement must clearly state the method of evaluating the proposals or quotations, and the relative importance attached to each criterion. Bidders must uniformly and objectively evaluate the proposals submitted by disadvantaged business in response to the advertisement based upon the evaluation criteria stated in the advertisement. The evaluation criteria must not be restrictive or exclusionary.

Summary Report of Disadvantaged Business Enterprise Requirements for Contractors

- 1) Completed and signed certification from bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services in the performance of this contract (may use IEPA DBE Form #1).

OR

"Certificate of publication, or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from a daily publication. For advertisements placed in a construction project clearinghouse such as www.construction.com, a screenshot of the advertisement, link to website, and receipt is required for proof of advertising.

- 2) List of all disadvantaged business enterprises (DBE) and non-DBE's that submitted proposals to the bidder/prime contractor. Specify as DBE or non-DBE, type of DBE, and the other information listed below (DBE Form #4 may be used for this purpose).

Name of Company
Name of Owners
Address of Company
E-mail Address of Company
Telephone Number
Date of Proposal
Type of Business
Type of DBE
Description of work to be performed

- 3) List of disadvantaged businesses that submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided (may use IEPA DBE Form #1).
- 4) Completed and signed copies IEPA DBE Form #3 (Subcontractor Utilization Form) or equivalent "Notice of Intent". Only applies if using DBE subcontractors.
- 5) Completed and signed certification from bidder(s) attesting that the bidder has no dominating or conflict of interest with the disadvantaged business to be utilized (IEPA DBE Form #1). Only applies if using DBE subcontractors.
- 6) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received (IEPA DBE Form #1).
- 7) **Note:** DBE Form #2 is **not** included in this packet. It is for consultants/engineers to report DBE activity. This form may be found in IEPA's DBE Guidance Manual which is available on the Agency's website or mailed upon request by calling 217-782-2027.

IEPA Disadvantaged Business Enterprise (DBE) Program Form #1

Contractor Certification Form

(To be completed by all Prime Contractors)

Please check the appropriate boxes that apply and complete the information on the bottom of the form.

- ☐ This firm will award no subcontracts (including in the procurement of equipment, supplies, or services), in the performance of this contract.
- ☐ This firm advertised for DBE subcontractors according to the good faith efforts outlined in the IEPA DBE Guidance Document.
- ☐ This firm received proposals from DBE(s) that will not be utilized. A list of the DBEs not hired, along with their address, phone number, and reason(s) for non-utilization, is below.

- ☐ This firm did not receive any inquiries from DBEs.

I certify that the above is true. I further certify that this firm and its partners, directors, and officers do not possess a controlling interest in ownership or conflict of interest or any other authority to control the DBE to be used during the performance of the contracts.

By: _____

NAME: _____

TITLE: _____

Company: _____

Date: ____ / ____ / ____

EPA Disadvantaged Business Enterprise (DBE) Program Form #3 Subcontractor Utilization Form

(Only complete this form if DBE subcontractors or sub-consultants will be working on a project)

This form is intended to capture the DBE subcontractor's description of work to be performed and the price of the work submitted to the prime contractor. All subcontractors must complete this form, and it must be included in the prime contractor's bid package.

Subcontractor Name	Project Name
Contact Person's Name & Title	
Address	
Telephone	Email
DBE Certified By:	Select all that apply. At least one is required: MBE WBE SBE DBE
Prime Contractor Name	
Type of Work to be Performed	Cost Estimate of Work

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to using the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 C.F.R. Part 33 Section 33.302(c).

Prime Contractor Signature:	Print Name:
Date:	Title:
Subcontractor Signature:	Print Name:
Date:	Title:

IEPA Disadvantaged Business Enterprise (DBE) Program Form #4, Bidders List
 (Only complete this form if subcontractors or sub-consultants will be working on a project)

Using this form/format is optional. Other formats are acceptable.

Company Name & Contact Person	Address	Phone No. w/ area code	Email	Proposed Work (supplies, paint, paint etc.)	DBE Status (MBE, WBE, DBE, SBE)
					Check if Hired ☐
					Check if Hired ☐
					Check if Hired ☐
					Check if Hired ☐

Illinois Works Apprenticeship Initiative
Periodic Loan Applicant/Grantee Report

Organization Name		FEIN Number		UEIN Number	
Loan/Grant Awarding Agency		Construction Start Date		Construction End Date	
Loan/Grant Number		Estimated Total Project Costs		Estimated Total State Contribution	

Reporting Period: Period Start Date Period End Date

Applicable Apprenticeship Goal (Select all that apply):

- ☐ 10% total project cost ☐ 10% total state contribution only
- ☐ Waiver Approved by IL DCEO IL DCEO Waiver Approval Date
- (If a waiver was granted for any prevailing wage classification, the Grantee does not need to report on those classifications on this form.)
- ☐ Reduction Approved by IL DCEO IL DCEO Reduction Approval Date
- (If selected, enter the applicable prevailing wage classification(s) and approved reduced percentage(s).)

Prevailing Wage Classification	Reduced Percentage	Prevailing Wage Classification	Reduced Percentage

Illinois Works Apprenticeship Initiative
Periodic Loan Applicant/Grantee Report

Prevailing Wage Classification	Reduced Percentage		Prevailing Wage Classification	Reduced Percentage

Organization Certification and State Agency Acknowledgement

1. Organization Certification:

By signing this form, I certify to the best of my knowledge and belief that the form is true, complete and accurate and that any false, fictitious or fraudulent information or the omission of any material fact could result in the immediate termination of my grant award(s).

Institution/Organization Name:

Printed Name (Executive Director or equivalent):

Title (Executive Director or equivalent):

Signature (Executive Director or equivalent):

Date/Time Field

2. State Agency Acknowledgement:

State Agency

Printed Name

Title

Signature:

Date/Time Field

Employment of Illinois Workers on Public Works Act

This law comes into effect following two consecutive months of a state unemployment rate above 5 percent. More information about the Employment of Illinois Workers on Public Works Act can be found here: <http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=549&ChapterID=7>.

The Employment of IL Workers on Public Works Act requires the workforce on all public works projects to be comprised of a minimum of 90% Illinois residents.

The Illinois Department of Labor (IDOL) administers the Employment of Illinois Workers on Public Works Act, which was enacted to alleviate unemployment in Illinois by ensuring that most workers on public works projects live in the state. The requirement applies to all labor on public works projects or improvements. That includes public works projects that are funded in whole or in part with state funds or funds administered by the state of Illinois. Any public works project financed in whole or in part by federal funds administered by the state of Illinois is covered under the provisions of this act.

By signing below, the Contractor confirms awareness of this requirement.

(Typed Name & Title of Authorized Representative)

(Signature of Authorized Representative) (Date)

(Company/Organization)

QUALIFICATIONS STATEMENT

THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT
PERMITTED BY LAWS AND REGULATIONS

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		☐ Yes ☐ No ☐ Pending	

- 1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

- 1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:		
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	\$	
Name:		Title:		

ARTICLE 2—LICENSING

- 2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
☐ None		

ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

- 5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business's most recent financial statement:		☐ Attached	
Date of Business's most recent audited financial statement:		☐ Attached	
Financial indicators from the most recent financial statement			
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

ARTICLE 6—SURETY INFORMATION

- 6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

- 7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

- 8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

- 8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:			
As a general contractor:		As a joint venturer:	
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:			
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No			
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No			
Been released from a bid in the past 5 years? ☐ Yes ☐ No			
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No			
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No			
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No			
Provide full details in a separate attachment if the response to any of these questions is Yes.			

- 8.03 List all projects currently under contract in Schedule A and provide indicated information.
- 8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.
- 8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

- 9.01 Provide the following information with the Statement of Qualifications:
- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
 - B. Diverse Business Certifications if required by Paragraph 3.01.
 - C. Certification of Business's safety performance if required by Paragraph 4.02.
 - D. Financial statements as required by Paragraph 5.01.
 - E. Attachments providing additional information as required by Paragraph 8.02.
 - F. Schedule A (Current Projects) as required by Paragraph 8.03.
 - G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
 - H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
 - I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(date signed)

(If Business is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Address for giving notices:

Designated Representative:

Name:

(typed or printed)

Title:

(typed or printed)

Address:

Phone:

Email:

Schedule A—Current Projects

Name of Organization		Project Name	
Project Owner			
General Description of Project		Project Name	
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Project Manager	
		Safety Manager	
		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner		Telephone	
Designer		Email	
Construction Manager			
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Project Manager	
		Safety Manager	
		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner		Telephone	
Designer		Email	
Construction Manager			
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Project Manager	
		Safety Manager	
		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner		Telephone	
Designer		Email	
Construction Manager			
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Project Manager	
		Safety Manager	
		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner		Telephone	
Designer		Email	
Construction Manager			
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Project Manager	
		Safety Manager	
		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner		Telephone	
Designer		Email	
Construction Manager			

Schedule B—Previous Experience with Similar Projects

Name of Organization		Project Name	
Project Owner			
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager			
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager			
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager			
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager			
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email

Schedule B—Previous Experience with Similar Projects

Name of Organization		Project Name	
Project Owner			
General Description of Project			
Project Cost		Date Project	
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager
Name			Quality Control Manager
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager
Name			Quality Control Manager
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager
Name			Quality Control Manager
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager
Name			Quality Control Manager
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Owner	Name	Title/Position	Organization
Designer			Telephone
Construction Manager			Email

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

SECTION 00 52 00

AGREEMENT

THIS AGREEMENT is by and between _____
(hereinafter called OWNER) and _____
(hereinafter called CONTRACTOR).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

OWNER and CONTRACTOR, in consideration of the mutual covenants set forth herein, agree as follows:

Article 1. WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Article 2. THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Article 3. ENGINEER

3.01 OWNER has retained Strand Associates, Inc.® ("ENGINEER") to act as OWNER's representative, assume all duties and responsibilities of ENGINEER, and have the rights and authority assigned to ENGINEER in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by ENGINEER.

Article 4. CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Time of Completion

A. The Work will be substantially complete within 670 calendar days after the date when the Contract Time commences to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 730 calendar days after the date when the Contract Time commences to run.

4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence as stated in Paragraph 4.01 above and that OWNER will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: CONTRACTOR shall pay OWNER \$1,500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete. This amount is comprised of \$1,500 per day for engineering, construction administration services, and construction observation services, and \$0 per day for administration, labor, expenses, and other costs that will be incurred by OWNER.

2. Completion of Remaining Work: After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, CONTRACTOR shall pay OWNER \$1,500 for each day that expires after such time until the Work is completed and ready for final payment. This amount is comprised of \$1,500 per day for engineering, construction administration services, and construction observation services, and \$0 per day for administration, labor, expenses, and other costs that will be incurred by OWNER.

3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

Article 5. CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds as follows, subject to adjustment under the Contract:

A. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit. The awarded Contract amount includes the Lump Sum Base Bid plus Bid Alternatives (list those chosen).

B. All specific Cash Allowances are included in the Contract Price and have been computed in accordance with Paragraph 13.02 of the General Conditions.

Article 6. PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as established at the preconstruction conference during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established in Paragraph 2.05.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. OWNER will retain an amount equal to 10% of each progress payment application until 50% of the Work has been completed. At 50% completion, OWNER shall reduce the retainage so that no more than 5% of the Work completed is withheld. For subsequent progress payment applications beyond 50% completion, OWNER will retain an amount equal to 5% of the payment being requested.

6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Paragraph 15.06.

6.04 Consent of Surety

A. OWNER will not make final payment unless CONTRACTOR submits written consent of the surety to such payment.

Article 7. HIERARCHY

7.01 In resolving inconsistencies among two or more sections of the Contract Documents, precedence shall be given in the following order:

First:	WRITTEN AMENDMENTS
Second:	CHANGE ORDERS/FIELD ORDERS/WORK CHANGE DIRECTIVES
Third:	ADDENDA
Fourth:	AGREEMENT
Fifth:	SUPPLEMENTARY CONDITIONS
Sixth:	GENERAL CONDITIONS
Seventh:	SPECIFICATIONS
Eighth:	DRAWINGS

For categories that have the same order of precedence, the document that includes the latest date shall control. Figure dimensions (numerical) on Drawings shall take precedence over dimensions measured utilizing a scale.

Article 8. REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 CONTRACTOR's Representations

A. In order to induce OWNER to enter into this Contract, CONTRACTOR makes the following representations:

1. CONTRACTOR has examined and carefully studied the Contract Documents, including Addenda.
2. CONTRACTOR has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. CONTRACTOR is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. CONTRACTOR has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site, if any, that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. CONTRACTOR has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. CONTRACTOR has considered the information known to CONTRACTOR itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR; and (c) CONTRACTOR's safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, CONTRACTOR agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.
9. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. CONTRACTOR's entry into this Contract constitutes an incontrovertible representation by CONTRACTOR that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 CONTRACTOR's Certifications

A. CONTRACTOR certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of OWNER, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

Article 9. CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00 52 00-1 through 00 52 00-____, inclusive);
2. Performance bond (pages 00 61 13.13-1 through 00 61 13.13-4, inclusive);
3. Payment bond (pages 00 61 13.16-1 through 00 61 13.16-4, inclusive);
4. Other bonds
 - a. _____ (pages _____ to _____, inclusive);
5. General Conditions (pages 00 72 00-1 through 00 72 00-____, inclusive);
6. Supplementary Conditions (pages 00 73 00-1 through 00 73 00-____, inclusive);
7. Specifications as listed in the table of contents of the Project Manual;
8. Drawings—Sheets No. _____ through No. _____

inclusive incorporated herein by reference with each sheet bearing the following general title:

as well as drawings listed in the table of contents that are bound at the back of these Specifications.

9. Addenda (_____).

10. Exhibits to this Agreement (enumerated as follows:)

- a. CONTRACTOR's Bid (pages ____ to ____);
- b. Documentation submitted by CONTRACTOR prior to Notice of Award
(_____);
- c. (_____);

11. The following may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:

- a. Notice to Proceed (pages {____} to {____}, inclusive);
- b. Erosion Control Certification (pages {____} to {____}, inclusive);
- c. Work Change Directives (not attached to this Agreement);
- d. Change Order(s) (not attached to this Agreement);
- e. Warranty Bond, if any.

B. The Contract Documents listed in Paragraph 9.01.A. are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 11.01 of the General Conditions.

Article 10. MISCELLANEOUS

10.01 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall

be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.02 Integration

A. The parties' entire agreement is contained in the Contract Documents, and the provisions of the Contract Documents supersede all prior discussions or writings between the parties.

10.03 Compliance with Illinois Environmental Protection Agency Public Water Supply Loan Program

A. CONTRACTOR shall comply with all requirements of the Illinois Environmental Protection Agency Water Public Water Supply Loan Program. Failure by CONTRACTOR to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or other legally available remedies. Requirements include but are not limited to the following:

1. CONTRACTOR shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. CONTRACTOR shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements.

2. Audit; Access to Records

a. CONTRACTOR shall maintain books, records, documents, and other evidence directly pertinent to the performance of this Contract in accordance with generally accepted accounting principles. CONTRACTOR shall also maintain the financial information and data used by CONTRACTOR in the preparation or support of any cost submissions required by Change Order and a copy of the cost summary submitted to OWNER. The Illinois Auditor General, OWNER, the Illinois Environmental Protection Agency, or any of their authorized representatives shall have access to the books, records, papers, documents, and other evidence for purposes of inspection, audit, examination, excerpts, transcriptions, and copying. CONTRACTOR shall provide facilities for access and inspection.

b. For a formally advertised, competitively awarded, fixed price contract, CONTRACTOR shall include access to records as required by Paragraph 10.09.A above for all negotiated Change Orders and Contract amendments in excess of \$25,000 that affect the Contract price. In the case of all other prime contracts, CONTRACTOR shall agree to include access to records required by Paragraph 10.06.A.2.a above in all contracts and all tier subcontracts or Change Orders in excess of \$25,000 that are directly related to the Work.

c. Audits shall be in accordance with auditing standards generally accepted in the United States.

d. CONTRACTOR shall agree to the disclosure of all information and reports resulting from access to records required by Paragraph 10.06.A.2.a above. When the audit concerns the CONTRACTOR, the auditing agency shall afford CONTRACTOR an opportunity for an audit exit conference and an opportunity to comment on the pertinent portions of the draft audit report. The final audit report shall include the written comments, if any, of the audited parties.

- e. The records required by Paragraph Paragraph 10.06.A.2.a above shall be maintained and made available during performance of the work under the loan agreement and for 3 years after the date of final loan audit. In addition, records that relate to any dispute or litigation or the settlement of claims arising out of any performance, costs, or items to which an audit exception has been taken shall be maintained and made available for 3 years after resolution of the dispute, appeal, litigation, claim, or exception.
- f. The right of access will generally be exercised with respect to financial records under negotiated prime contracts, negotiated Change Orders or Contract amendments in excess of \$25,000 affecting the prices of any formally advertised, competitively awarded, fixed price contract; and subcontracts or purchase orders under any Contract other than a formally advertised, competitively awarded, fixed price contract.
- g. The right of access will generally not be exercised with respect to a prime contract, subcontract, or purchase order awarded after effective price competition. In any event, the right of access shall be exercised under any type of contract or subcontract with respect to records pertaining directly to contract performance, excluding any financial records of the contractor; and if there is any indication that fraud, gross abuse, or corrupt practices may be involved in the award or performance of the contract or subcontract.
3. CONTRACTOR shall warrant that no person or selling agency has been employed or retained to solicit or secure the Contract upon an Agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warranty, OWNER shall have the right to annul Contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of the commission, percentage, brokerage, or contingent fee.
4. CONTRACTOR shall pay prevailing wages in accordance with the Davis-Bacon Act (40 USC 276a through 276a-5, as defined by the U.S. Department of Labor.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This Agreement will be effective on _____, _____ (which is the Effective Date of the Contract).

OWNER _____

Signature and Title

ATTEST:

By: _____
Signature and Title

Address for Giving Notices:

Name: _____
Street: _____
City, State, Zip Code: _____
Phone: _____
Facsimile: _____
E-mail: _____
Designated Representative: _____

CONTRACTOR _____

Signature and Title

ATTEST:

By: _____

Signature and Title

Address for Giving Notices:

Name: _____

Street: _____

City, State, Zip Code: _____

Phone: _____

Facsimile: _____

E-mail: _____

Designated Representative: _____

License No.: _____

(Where applicable)

(If CONTRACTOR is a corporation, limited liability company, or a partnership, attach evidence of authority to sign.)

INSTRUCTIONS FOR EXECUTING CONTRACT

The full name and business address of CONTRACTOR should be inserted and the Agreement should be signed with CONTRACTOR's official signature. Please have the name of the signing party printed under all signatures to the Agreement.

If CONTRACTOR is operating as a partnership, each partner should sign the Agreement. If the Agreement is not signed by each partner, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such Agreement for and on behalf of the partnership.

If CONTRACTOR is an individual, the trade name (if CONTRACTOR is operating under a trade name) should be indicated in the Agreement and the Agreement should be signed by such individual. If signed by other than CONTRACTOR, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's authority to execute such Agreement for and on behalf of CONTRACTOR.

If CONTRACTOR is operating as a limited liability company, and it is member-managed, each member should sign the Agreement, or an authorized member should sign. If the LLC is manager-managed, an authorized manager should sign. If the Agreement is not signed by each member, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such Agreement for and on behalf of the LLC.

If CONTRACTOR is a corporation, the Secretary of the corporation should sign the certificate below. If the Agreement itself is signed by the Secretary of the corporation, the certificate below should be executed by some other officer of the corporation. In lieu of the following certificate, there may be attached to the Agreement copies of so much of the records of the corporation which will show the official character and authority of the officers signing, duly certified by the Secretary or Assistant Secretary to be true copies.

I, _____, certify that I am the _____
(Print Name) (Title of Individual Signing this Certificate)

of the corporation named as CONTRACTOR herein above; that _____,
(Print Name of Officer Signing Agreement)

who signed the foregoing Agreement on behalf of CONTRACTOR was then

_____ of said corporation; that said Agreement was duly signed
(Title of Officer Signing Agreement)

for and on behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

(Individual Signature)

END OF SECTION

NOTICE OF INTENT TO AWARD

To: _____

Project Description: _____

The OWNER has considered the BID submitted by you for the above described WORK, in response to its Advertisement for Bids, dated _____ and Information for Bidders.

You are hereby notified that your BID will be accepted, contingent upon Illinois Environmental Protection Agency (IEPA) approval, for items in the amount of _____.

You will be required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within fifteen (15) calendar days from the date of the final Notice to be sent upon IEPA approval, to you.

Dated this day of _____

OWNER

By: _____

Title: _____

NOTICE OF AWARD

To: _____

PROJECT Description: _____

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated _____, 20____ and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within fifteen (15) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20_____.

(Owner)

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged,

by _____,

this the _____ day of _____, 20_____.

By _____

Title _____

Change Order No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:	Date of Contract:	
Contractor:	Engineer's Project No.:	

The Contract Documents are modified as follows upon execution of this Change Order:

Description: _____

Attachments: (List documents supporting change): _____

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price: \$ _____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable): _____	Date: _____	

SECTION 00 55 00
NOTICE TO PROCEED

Dated: _____

TO: _____
(CONTRACTOR)

ADDRESS: _____

PROJECT: _____

OWNER'S CONTRACT NO.: _____

CONTRACT FOR: _____

(Insert name of Contract as it appears in the Bidding Documents)

You are notified that the Contract Time under the above Contract will commence to run on _____ day of _____, 20____. On that date, you are to start performing your obligations under the Contract Documents.

Before you may start any work at the site, Paragraph 2.01.B of the General Conditions provides that you must deliver to OWNER (with copies to ENGINEER and other identified additional insureds) certificates of insurance, copies of endorsements, and other evidence of insurance which you are required to purchase and maintain in accordance with the Contract Documents.

Also before you may start any work at the site, you must _____

(Add Other Requirements)

(OWNER)

By: _____
(Authorized Signature)

(Title)

END OF SECTION

SECTION 00 55 10

EROSION CONTROL CERTIFICATION

Dated: _____

TO: _____
(OWNER)

ADDRESS: _____

PROJECT: _____

OWNER'S CONTRACT NO.: _____

CONTRACT FOR: _____

(Insert name of Contract as it appears in the Bidding Documents)

I certify under penalty of law that I understand the terms and conditions of the General National Pollutant Discharge Elimination System (NPDES) Permit (ILR10) that authorizes the stormwater discharges associated with industrial activities from the construction site and as may be detailed in the Contract Documents. This certification statement is a part of the Stormwater Pollution Prevention Plan (SWPP) for the project described above in accordance with the General NPDES Permit No. ILR10 issued by the Environmental Protection Agency.

I agree to indemnify and hold OWNER harmless from any claims, demands, suits, causes of action, settlements, fines, or judgments and the costs of litigation, including, but not limited to, reasonable attorneys fees and costs of investigation and arising from a condition, obligation, or requirement assumed or to be performed by CONTRACTOR for storm water pollution and erosion control.

Fines and other costs incurred against OWNER for CONTRACTOR's failure to provide the required erosion control practices will be paid by CONTRACTOR.

(CONTRACTOR)

By: _____
(Authorized Signature)

(Title)

END OF SECTION

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

- 5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
- 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
14. Definitions
 - 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. ~~Modifications to this Bond are as follows: [Describe modification]~~

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address (<i>principal place of business</i>): [Address of Owner's principal place of business]	Contract Description (<i>name and location</i>): [Owner's project/contract name, and location of the project] Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: ☐ None ☐ See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
By: _____ (<i>Full formal name of Contractor</i>) _____ (<i>Signature</i>)	By: _____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>) _____ (<i>Signature</i>)(<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.

- 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
 9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
 10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
 11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
 12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
 13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
 14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
 15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1. *Claim*—A written statement by the Claimant including at a minimum:

- 16.1.1. The name of the Claimant;
- 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
- 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
- 16.1.4. A brief description of the labor, materials, or equipment furnished;
- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
- 16.1.7. The total amount of previous payments received by the Claimant; and
- 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

~~18. Modifications to this Bond are as follows: [Describe modification]~~

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
- 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 - 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 - 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 - 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 - 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 - 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 - 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 - 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 - 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 - 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 - 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:* Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance:* Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 - 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

A. These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

B. The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

C. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

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SC-1.01.A Defined Terms

Insert in the first sentence after the phrase “printed with initial capital letters” the following phrase:

“or with all capital letters”

SC-1.01.A.8 Change Order

Insert a comma and the word “ENGINEER” immediately after the word “CONTRACTOR” in this definition.

SC-1.01.A.18 Drawings

Add the following to the end of Paragraph 1.01.A.18:

The following Drawings are part of the Contract Documents:

Drawings titled “Eastern and Western Receiving Stations, Contract 2-2025, City of Crest Hill, Illinois,” Sheets No. 1 through No. 78, prepared by Strand Associates, Inc.® and Drawings listed in the table of contents that are bound at the back of these Specifications.

Electronic files were provided for the convenience of CONTRACTOR. The data on which CONTRACTOR may rely is limited to the paper copy.

SC-1.01.A.50 Work Change Directive

Amend the phrase “signed by OWNER” in the first sentence of Paragraph 1.01.A.50 to read as follows:

“signed by OWNER and CONTRACTOR.”

Add the following language to the end of Paragraph 1.01.A.50:

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

SC-1.01.A.51 Request for Information

Add the following new paragraph immediately after Paragraph 1.01.A.50:

51. Request for Information

Written request submitted by CONTRACTOR to ENGINEER on a form supplied by ENGINEER requesting clarification, interpretation, or additional information pertaining to Contract Documents.

SC-1.01.A.52 Geotechnical Engineer

Add the following new paragraph immediately after Paragraph 1.01.A.51:

52. Geotechnical Engineer

The individual or entity that prepared the geotechnical report that is referenced in the Supplementary Conditions and that provides geotechnical engineering services, if any, during construction of the Project.

SC-1.01.A.53 Testing Firm

Add the following new paragraph immediately after Paragraph 1.01.A.52:

53. Testing Firm

The individual or entity that performs materials testing during construction of the Project.

SC-1.01.A.54 Special Inspector

Add the following new paragraph after Paragraph 1.01.A.53:

54. Special Inspector

The individual(s) or entity(ies) that perform special inspection testing during construction of the Project as defined in the IBC Chapter 17 and as shown on the Drawings.

SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete Paragraphs 2.01.B and 2.01.C in their entirety and insert the following in their place:

B. Evidence of CONTRACTOR's Insurance: When CONTRACTOR delivers the signed counterparts of the Agreement to OWNER, CONTRACTOR shall also deliver to OWNER copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by CONTRACTOR in this Contract. CONTRACTOR may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02 Copies of Documents

Amend the first sentence of Paragraph 2.02.A to read as follows:

OWNER shall furnish to CONTRACTOR three printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

SC-2.03 Before Starting Construction

Add the following subparagraph to Paragraph 2.03:

4. a proposed listing of subcontractors and major material and equipment suppliers. The list shall include any proposed substitutions in accordance with Paragraph 7.06.

SC-2.05 Acceptance of Schedules

Add the following language to the end of Paragraph 2.05.A.2:

The schedule for submittals shall show all submittals complete before 50% of completion of the Work and the schedule for maintenance manuals shall show all submittals complete before 75% of completion of the Work.

Add the following new paragraph immediately after Paragraph 2.05.A:

- B. The times included in this paragraph apply to the preliminary schedules. See Division 01 for other submittal and time requirements for the construction progress schedule and submittal schedule.

SC-3.03 Reporting Discrepancies

Add the following language at the end of Paragraph 3.03.A:

4. CONTRACTOR shall report apparent discrepancies to ENGINEER using a Request for Information form on a form supplied by ENGINEER. The Request for Information form shall:
 - a. be submitted by CONTRACTOR only;
 - b. be legible and complete;
 - c. not be used for the purposes of only confirming or verifying issues; and,
 - d. be prioritized by CONTRACTOR in the event that multiple Requests for Information are outstanding.

Requests for Information that are not in conformance with the requirements above shall be returned to CONTRACTOR without response.

5. CONTRACTOR shall not be relieved of its responsibility to coordinate the Work to prevent adverse impacts to CONTRACTOR's Project Schedule while submitting Requests for Information.

6. If CONTRACTOR believes the Scope of Work included in the Request for Information has a cost and/or time impact, CONTRACTOR should submit a Change Proposal in accordance with Article 11 of these General Conditions.

7. If CONTRACTOR proceeds with work when CONTRACTOR had actual knowledge or should have known that a conflict, error, ambiguity, or discrepancy existed as indicated above, correction of work constructed without such notification to ENGINEER shall be at CONTRACTOR's expense, (except in an emergency as authorized by Paragraph 7.15.A).

SC-3.04 Requirements of the Contract Documents

Delete Paragraph 3.04.C in its entirety.

SC-4.01 Commencement of Contract Times; Notice to Proceed

In the last sentence of Paragraph 4.01.A, change "60th day" to "135th day."

SC-4.03 Reference Points

Add the following new paragraph immediately after Paragraph 4.03.A:

B. CONTRACTOR is referred to the General Requirements for additional requirements for laying out the work.

SC-5.03 Subsurface and Physical Conditions

Add the following new paragraphs immediately after Paragraph 5.03.D:

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which CONTRACTOR may rely:

Report Title	Date of Report	Technical Data
Geotechnical Engineering Services Report, Western Receiving Station, 2305-2309 Caton Farm Road, Crest Hill Illinois, Rubino Engineering, Inc., Project No. G24.156A	January 3, 2025	Boring methods, level of subsurface water, boring logs, laboratory test methods and results, and boring locations
Geotechnical Engineering Services Report, Eastern Receiving Site, Caton Farm Road and Oakland Avenue, Crest Hill Illinois, Rubino Engineering, Inc., Project No. G24.156B_REV 1	March 18, 2025	Boring methods, level of subsurface water, boring logs, laboratory test methods and results, and boring locations

ENGINEER accepts no responsibility for accuracy of the soil data or water level information. Soil information, included with these Contract Documents, was not obtained for the purposes of designing excavations and trenches. Soil information was used by ENGINEER for design purposes only. CONTRACTOR shall assure itself by personal examination as to subsurface conditions and shall provide its own investigations and make its own assumptions to comply with OSHA and any other applicable laws and regulations regarding excavation and trenching requirements.

F. No drawings of physical conditions relating to existing surface or subsurface structures at the Site containing technical data, are known to OWNER. CONTRACTOR shall conduct its own personal investigation to determine conditions at the site which may affect the Work, including compliance with OSHA excavation and trenching requirements.

SC-5.05 Underground Facilities

Add the following paragraph immediately after Paragraph 5.05.F:

G. CONTRACTOR is referred to the General Requirements for requirements for keeping records of Underground Facilities and allowing facility owners to inspect.

SC-5.06 Hazardous Environmental Conditions at the Site

Add the following new subparagraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to OWNER relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which CONTRACTOR may rely:

Report Title	Date of Report	Technical Data
Source Site Certification by Owner or Operator for Use of Uncontaminated Soil as a Fill in a CCDD or Uncontaminated Soil Fill Operations LPC-662	Jan. 3, 2025	Laboratory test methods and results, IEPA LPC-662

SC-6.01 Performance, Payment and Other Bonds

Add the following new paragraphs immediately after Paragraph 6.01.H:

I. The forms of the performance and payment or other Bonds attached hereto shall be used for the Contract. Note instructions thereon as to the form applicable. Each form contemplates one corporate surety only. In case co-sureties or individual sureties will be furnished, proper forms therefore shall be obtained. Besides the stipulations of Paragraphs 6.01 through 6.03, the surety on the Bonds shall provide a certificate indicating surety is licensed to underwrite contracts in the jurisdiction of the project location which shall be attached to the Bonds.

J. Bonds shall be placed with surety with a Best's rating of no less than A-.

SC-6.03 CONTRACTOR's Insurance

Add the following new language to the end of Paragraph 6.03.C.3:

CONTRACTOR shall provide an executed endorsement form CG 20 01 04 13, or equal, supporting this requirement.

Add the following new paragraphs under Paragraphs 6.03.C:

D. Other Additional Insureds: As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to OWNER and ENGINEER) the following: None.

E. **Worker's Compensation and Employer's Liability:** CONTRACTOR shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000

F. **Commercial General Liability—Claims Covered:** CONTRACTOR shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of CONTRACTOR, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. **Commercial General Liability—Form and Content:** CONTRACTOR's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. CONTRACTOR shall furnish OWNER and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of CONTRACTOR's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.

4. Underground, explosion, and collapse coverage.

5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together), or equal, for each required additional insured. If CONTRACTOR demonstrates to OWNER that the specified ISO endorsements are not commercially available, then CONTRACTOR may satisfy this requirement by providing equivalent endorsements.

7. Insurance certificates for commercial general, automobile, and umbrella shall specifically indicate by name the additional insureds which are to include OWNER and ENGINEER as well as other persons or entities so identified. Certificates shall be Acord 25-S or equivalent.

8. Endorsements or General Liability policy shall not exclude supervisory or inspection services.

H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if CONTRACTOR is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).

6. Any limitation or exclusion based on the nature of CONTRACTOR’s work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

General Aggregate Limits specified above shall apply separately to this project by attachment of:

"Amendment of Limits of Insurance–Designated Location(s) General Aggregate Limit Endorsement (ISO Form No. CG 25 04 05 09) or "Designated Construction Project(s) General Aggregate Limit" Endorsement (ISO Form CG 25 03 05 09) or equivalent endorsement coverage.

J. *Automobile Liability*: CONTRACTOR shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$2,000,000

CONTRACTOR shall also provide an Additional Insured Endorsement for the automobile policy. Endorsement form shall be CA 20 48, or equal.

K. *Umbrella or Excess Liability*: CONTRACTOR shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$5,000,000
General Aggregate	\$5,000,000

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements*: CONTRACTOR may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$5,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.

M. *Contractor's Pollution Liability Insurance*: CONTRACTOR shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from CONTRACTOR's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$2,000,000
General Aggregate	\$2,000,000

☐ If box is checked, CONTRACTOR is not required to provide this insurance.

CONTRACTOR's Pollution Liability coverage shall include coverage for fungus, mold, and bacteria.

N. *Contractor's Professional Liability Insurance:* If CONTRACTOR will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then CONTRACTOR shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

CONTRACTOR's Professional Liability	Policy limits of not less than:
Each Claim	\$2,000,000
Annual Aggregate	\$5,000,000

☐ If box is checked, CONTRACTOR is not required to provide this insurance.

O. *Railroad Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, CONTRACTOR shall endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad.

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	Not Applicable
Aggregate	Not Applicable

☒ If box is checked, CONTRACTOR is not required to provide this insurance.

P. *Unmanned Aerial Vehicle Liability Insurance:* If CONTRACTOR uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, CONTRACTOR shall obtain UAV liability insurance in the amounts stated; name OWNER, ENGINEER, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to OWNER confirming CONTRACTOR's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$1,000,000
General Aggregate	\$2,000,000

☐ If box is checked, CONTRACTOR is not required to provide this insurance.

Q. *Waiver of Subrogation:* CONTRACTOR's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall provide a waiver of subrogation covering OWNER and ENGINEER, and any individuals or entities identified in the Supplementary Conditions.

CONTRACTOR shall obtain all necessary endorsements to support these requirements. Endorsement shall be CG 24 04 05 09, or equal.

R. General Liability, Automobile Liability, and Umbrella Liability shall include coverage for mental anguish and punitive damages.

S. The specimen Insurance Certificate bound at the end of this section has been prepared as a guide to assist CONTRACTOR and CONTRACTOR's Insurance Agent when preparing the required insurance documentation. This specimen certificate is included as a representation of what acceptable documents will look like. Specific project information must be included when preparing the actual document.

SC-6.04 Builder's Risk and Other Property Insurance

Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (including that caused by flood and hydrostatic pressure).

a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to OWNER and CONTRACTOR.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including OWNER-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

5. extend to cover damage or loss to insured property while in transit.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by OWNER by endorsement, and without cancellation or lapse of coverage.

8. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of OWNER's procurement of property insurance following Substantial Completion, whichever occurs first.

9. include as named insureds OWNER, CONTRACTOR, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds."

G. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$10,000 for direct physical loss in any one occurrence.

SC-7.03.C Labor; Working Hours

Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be 7 A.M. until 5 P.M. at the West Site, and 6:30 A.M. until 5 P.M. at the East Site. Working hours on Saturday and Sunday are 8 A.M. to 5 P.M. CONTRACTOR must receive written permission from OWNER to work on a Saturday or Sunday.

2. OWNER's legal holidays are New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and the following day, Christmas Eve, and Christmas Day.

Add the following new paragraph immediately after Paragraph 7.03.C:

D. CONTRACTOR shall be responsible for the cost of any overtime pay or other expense incurred by OWNER for ENGINEER's services (including those of the Resident Project Representative, if any), OWNER's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If CONTRACTOR is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then OWNER may impose a reasonable set-off against payments due under Article 15.

SC-7.04.B Services, Materials, and Equipment Warranty

Add the following to the end of Paragraph 7.04.B:

Suppliers shall be deemed to impliedly warrant that their products and all component materials incorporated into them are suitable and fit for the intended use of such products and shall be free from defect in material, workmanship or design, such warranty to run to the benefit of OWNER and ENGINEER. The foregoing applies whether the products or their component materials are specified in the Contract Documents or are of Supplier's design.

SC-7.05 and 7.06 "Or Equals" and Substitutes

Add the following new paragraph immediately after Paragraph 7.05.E.:

F. All requirements of Paragraph 7.06 shall apply to review and acceptance of Other Alternative Equipment Manufacturers listed on the Equipment Alternatives form of the Lump Sum Base Bid. For Requested Alternative Equipment Manufacturers that were provided within the Bidding Documents, all requirements of Paragraph 7.06 shall apply, except for Paragraph 7.06.D—Reimbursement of ENGINEER's Cost.

SC-7.09 Permits

Delete last sentence of Paragraph 7.09.A and add the following in its place:

See General Requirements and technical specification sections for utility charge provisions.

Add Paragraph 7.09.B as follows:

B. See General Requirements for additional permit information.

SC-7.10 Taxes

Add the following new paragraph immediately after Paragraph 7.10.A:

B. OWNER is exempt from payment of sales and compensating use taxes of the State of Illinois, the City of Crest Hill, and the County of Will on all materials to be incorporated into the Work.

1. OWNER will furnish the required certificates of tax exemption to CONTRACTOR for use in the purchase of supplies and materials to be incorporated into the Work.

2. OWNER's exemption does not apply to highway, street, or road construction included in the Work.

3. OWNER's exemption also does not apply to construction, tools, machinery, equipment, or other property purchased by or leased by CONTRACTOR, or to supplies or materials not incorporated into the Work.

SC-7.11 Laws and Regulations

Add the following new paragraph immediately after Paragraph 7.11.C:

D. CONTRACTOR shall comply with Employment of Illinois Workers on Public Works Act 30 ILCS 570, which requires contractors to use Illinois laborers on all public works construction and

improvement projects during a period of excessive unemployment. Excessive unemployment is defined as any month immediately following two consecutive calendar months that the Illinois unemployment rate exceeds 5%, CONTRACTOR agrees to employ a work force that is comprised of at least 90% Illinois laborers. An "Illinois laborer" is defined as any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident.

Add the following new paragraph immediately after Paragraph 7.11.D:

E. CONTRACTOR shall comply with the following, including all reporting or notification requirements:

1. Title VI of the Civil Rights Act of 1964 (P.L. 88-352), which provides that no person shall on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
2. Federal Water Pollution Control Act Amendments of 1972, Section 13, which provides that no person shall on the basis of sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance under this Act.
3. Title IX of the Education Amendments of 1972, which provides that no person shall on the basis of sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance.
4. Age Discrimination Act of 1975 (P.L. 94-135), which prohibits, with certain exceptions, discrimination on the basis of age in programs or activities receiving federal financial assistance.
5. Section 504 of the Rehabilitation Act of 1973 (including Executive Orders 11914 and 11250), which provides that no otherwise qualified handicapped individual shall solely by reason of his or her handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
6. Equal Employment Opportunity Requirements, Executive Order 11246, which requires that a contractor under a federal or federally assisted constructed project not discriminate in employment on the basis of race, color, religion, sex, or national origin. The Order requires contractors to take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Further, it requires CONTRACTOR to post all mandatory equal opportunity notices and complete all required Department of Labor and Equal Opportunity Commission reporting forms.
7. Davis-Bacon Act (40 U.S.C., 276 et. seq.), which requires that wages for all laborers and mechanics employed by contractors or subcontractors for federally-funded treatment works conform to prevailing wage rates established for the locality as determined by the Secretary of Labor under the Davis-Bacon labor wage provisions.
8. Debarment and Suspension Requirements, Executive Order, 40 CFR, Part 32, which requires recipients, contractors, and subcontractors to provide certifications that they will not knowingly enter into contracts with individuals or businesses which have been debarred or suspended from federal assistance programs.
9. Women's and Minority Business Enterprise, Executive Orders 11625 and 12138, and 40 CFR 35.3145(d) and (e), which establishes requirements and procedures for the utilization

and reporting of minority and women owned (MBE/WBE) business participation in for federally funded projects, and Small Rural Business Enterprise requirements.

10. Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans, which prohibits the recipient from entering into contracts or otherwise extending federal assistance to individuals or facilities listed in the Environmental Protection Agency's list of Violating Facilities.

SC-7.12 Record Documents

In Paragraph 7.12.A delete last sentence and insert the following:

Upon completion of the Work, these record documents, samples, and shop drawings shall be delivered by CONTRACTOR to OWNER.

SC-7.13 Safety and Protection

Add the following language to the end of Paragraph 7.13.A:

If the Work includes excavation or trenches, CONTRACTOR shall keep at the Site at all times during the progress of the Work a competent person to comply with OSHA trenching and excavation requirements. The competent person shall be one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

SC-7.18 Indemnification

Delete the word "negligent" from Paragraph 7.18.A.

Add the following to the end of Paragraph 7.18.A:

In addition, CONTRACTOR shall indemnify, hold harmless, and pay for the defense of OWNER and ENGINEER from and against claims, losses, or damages in regard to any act or failure to act by OWNER or ENGINEER in connection with general supervision, inspection and/or coordination of CONTRACTOR's operations.

CONTRACTOR shall, at its own expense, appear, defend, and pay all fees of attorneys and all costs and other expenses arising therefrom or incurred in connection therewith; and, if any judgments shall be rendered against any individual or entity indemnified hereunder in any such action, CONTRACTOR shall, at its own expense, satisfy and discharge same. CONTRACTOR expressly understands and agrees that any Letter of Credit or insurance protection required by the Contract, or otherwise provided by CONTRACTOR, shall in no way limit the responsibility to indemnify, hold harmless, and defend any individual or entity indemnified hereunder as herein provided.

Add the following new paragraph immediately after Paragraph 7.18.B:

C. For any matter for which OWNER and ENGINEER are indemnified under Paragraph 7.18.A, CONTRACTOR shall pay for OWNER's and ENGINEER's reasonable defense, including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs or awards until OWNER or ENGINEER are found negligent.

SC-7.19 Delegation of Professional Design Services

Add the following new paragraphs immediately after Paragraph 7.19.G:

H. The design professional providing the design calculations and design drawings shall be licensed in the State of the Project.

I. The design calculation and design drawings are not shop drawings, but shall be submitted to ENGINEER separately along with the required shop drawings for the system, material, or equipment specified. These calculations will be forwarded to OWNER for their records.

SC-8.01 Other Work

Insert the following new paragraphs immediately after Paragraph 8.01.B:

1. OWNER intends to award a separate contract for a ground level storage tank on the East Site that will be constructed concurrently with this Work. OWNER is also aware that a third-party entity, Grand Prairie Water Commission, intends to construct delivery structures on the East and West Sites concurrently with this Work.

2. The following table lists the anticipated projects on the East and West Sites.

Project Name	Owner	Contract Number	Advertise to Bid	Notice to Proceed	Final Completion
Eastern and Western Receiving Stations	City of Crest Hill	2-2025	Feb. 17, 2026	Aug. 30, 2026	Aug. 29, 2028
Eastern Receiving Station Ground Level Storage Tank	City of Crest Hill	1-2025	Estimated July 21, 2026	Estimated Sept. 21, 2026	Estimated April 21, 2028
Grand Prairie Water Commission Delivery Structure (West Site)	Grand Prairie Water Commission		Estimated Sept. 1, 2027	Estimated Dec. 1, 2027	Estimated June 6, 2029
Grand Prairie Water Commission Delivery Structure (East Site)	Grand Prairie Water Commission		Estimated Sept. 1, 2027	Estimated Dec. 1, 2027	Estimated June 6, 2029

SC-8.02 Coordination

Delete Paragraphs 8.02.A and 8.02.B in their entirety and insert the following in its place:

A. OWNER intends to contract with others for the performance of other work at or adjacent to the Site.

1. CONTRACTOR (hereby defined as the construction coordinator) shall have authority and responsibility for coordination of OWNER's various contractors and work forces at the Sites;

2. The following specific matters are to be covered by such authority and responsibility: Safety precautions and procedures, keeping the Sites clean during construction, coordinating tests and inspections, use of temporary construction facilities including construction access entrances, and scheduling and coordinating the activities of OWNER's various contractors

3. The extent of such authority and responsibility is the Area of Sites as shown in the Drawings.

B. CONTRACTOR and its subcontractors shall cooperate with, coordinate work with, and give notice of intersection work to the contractors for the Grand Prairie Water Commission projects so that materials and equipment are installed at an agreed time and facilitate general progress of the Work.

SC-8.04 Claims Between Contractors

Add the following new paragraphs immediately after Paragraph 8.03:

A. Should CONTRACTOR cause damage to the work or property of any other contractor at the Site, or should any claim arising out of CONTRACTOR's performance of the Work at the Site be made by any other contractor against CONTRACTOR, OWNER, ENGINEER, or the construction coordinator, then CONTRACTOR (without involving OWNER, ENGINEER, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, the construction coordinator and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any other contractor against OWNER, ENGINEER, consultants, or the construction coordinator to the extent said claim is based on or arises out of CONTRACTOR's performance of the Work. Should another contractor cause damage to the Work or property of CONTRACTOR or should the performance of work by any other contractor at the Site give rise to any other Claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER, or the construction coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER, or the construction coordinator on account of any such damage or Claim.

C. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of another contractor, and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, CONTRACTOR may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be CONTRACTOR's exclusive remedy with respect to OWNER, ENGINEER, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from OWNER, ENGINEER, or construction coordinator for activities that are their respective responsibilities.

SC-10.03 Resident Project Representative

Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be ENGINEER's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with ENGINEER and CONTRACTOR. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of CONTRACTOR. The RPR will:

1. Conferences and Meetings: Attend meetings with CONTRACTOR, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including CONTRACTOR's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by CONTRACTOR and consult with ENGINEER concerning acceptability.

3. Liaison:

a. Serve as ENGINEER's liaison with CONTRACTOR. Working principally through CONTRACTOR's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

b. Assist ENGINEER in serving as OWNER's liaison with CONTRACTOR when CONTRACTOR's operations affect OWNER's on-Site operations.

c. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.

4. Interpretation of Contract Documents: Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by ENGINEER.

5. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to ENGINEER. Transmit to CONTRACTOR in writing decisions as issued by ENGINEER.

6. Review of Work and Rejection of Defective Work:

a. Conduct on-Site observations of CONTRACTOR's work in progress to assist ENGINEER in determining if the Work is in general proceeding in accordance with the Contract Documents.

b. Report to ENGINEER whenever RPR believes that any part of CONTRACTOR's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise ENGINEER of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

7. Tests and System Start-ups:

a. Observe that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate OWNER's personnel, and that CONTRACTOR maintains adequate records thereof.

- b. Observe, record, and report to ENGINEER appropriate details relative to the test procedures and systems start-ups.
- 8. Records:
 - a. Prepare a daily report or keep a diary or log book, and send periodic reports to ENGINEER.
- 9. Reports:
 - a. Furnish to ENGINEER periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to ENGINEER proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from CONTRACTOR.
 - c. Notify ENGINEER of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
- 10. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 11. Certificates, Operation and Maintenance Manuals: During the course of the Work, review materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to ENGINEER for review and forwarding to OWNER prior to payment for that part of the Work.
- 12. Completion:
 - a. Participate in ENGINEER's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in ENGINEER's visit to the Site in the company of OWNER and CONTRACTOR regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by CONTRACTOR.
 - d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of ENGINEER's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of OWNER or CONTRACTOR.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.
7. Authorize OWNER to occupy the Project in whole or in part.

SC-11.01 Amending and Supplementing the Contract

Delete the second sentence in Paragraph 11.01.C in its entirety.

SC-11.07 Change of Contract Price

Amend the phrase at the end of Paragraph 11.07.B.2 to read:

(which may include an allowance for overhead and profit in accordance with Paragraph 11.07.C.2. unless OWNER and CONTRACTOR agree that these allowances are not appropriate for the Work involved.)

SC-11.09.C Change Proposals

Delete Paragraph 11.09.C in its entirety and insert the following in its place:

"Not used."

SC-11.10 Notification to Surety

Add the following new paragraphs immediately after Paragraph 11.10.A:

B. CONTRACTOR shall be responsible for notifying the surety of any assignment, modification, or change of the Contract, change in the Work covered thereby, or extension of time for the completion of the project.

C. Failure to provide notice to the surety of any such change shall not exonerate the surety from its obligations under the bond.

SC-12.01.A Claims Process

Delete Paragraph 12.01.A.3 in its entirety and insert the following in its place:

“Not used.”

SC-14.02.A Tests and Inspections

Add the following to the beginning of Paragraph 14.02.A:

All Work is subject to testing to indicate compliance with Contract Document requirements. Copies of test results of all tests required shall be submitted to ENGINEER. Tests and inspection of work may be conducted by OWNER or an independent laboratory employed by OWNER. Tests may also be performed in the field by ENGINEER as a basis for acceptance of the Work.

Add the following to the end of Paragraph 14.02.A:

Samples required for testing shall be furnished by CONTRACTOR at no cost to OWNER. In the event that completed Work does not conform to specification requirements during the initial test, the Work shall be corrected and retested for conformance. The entire cost of retesting completed Work shall be borne by CONTRACTOR. This shall include the extra cost for inspection to OWNER which will be deducted from the final amount due CONTRACTOR.

SC-15.01.B Applications for Progress Payment

Add the following language at the end of Paragraph 15.01.B.1:

An updated Progress Schedule shall be submitted with each Application for Payment. Applications for Payment submitted without an acceptable updated Progress Schedule will be returned to CONTRACTOR without review. Progress Schedules that are submitted which do not reflect current project conditions, will not be considered acceptable.

Replace Paragraph 15.01.B.3 in its entirety with the following.

3. CONTRACTOR shall submit with each pay request CONTRACTOR's partial waiver of lien for the full amount of the requested payment. Beginning with the second pay request, and with each succeeding pay request, CONTRACTOR shall submit partial waivers of lien for each Subcontractor and Supplier showing that the amount paid to date to each is at least equivalent to the total value of Subcontractor's or Supplier's work, less retainage, included on the previous pay request. CONTRACTOR shall submit with each pay request a signed Waiver of Lien Log clearly documenting the following:

- a. The names of all Subcontractors/Suppliers on the project.
- b. Contract amounts for each Subcontractor/Supplier.
- c. Amount paid to date to each Subcontractor/Supplier.
- d. Lien waivers provided with current pay application for previous month's payments.

- e. Amount to be paid to each Subcontractor/Supplier included in the pending pay request.
- f. Remaining balance for each Subcontractor/Supplier.

Add the following language at the end of Paragraph 15.01.B.4:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of CONTRACTOR.

Add the following paragraphs immediately after Paragraph 15.01.B.4:

5. No advanced payment for shop drawing preparation will be made. Shop drawing costs will be paid when equipment and materials are delivered and suitably stored on the site.

6. All stored equipment and materials for which payment is requested shall have invoices included with the pay request. Equipment shall be identified thoroughly on the invoices, including serial numbers.

7. Payment for the stored equipment and material which are on the site shall not exceed the invoiced amount for each item, less the Contract retainage. The overhead and profit for the stored items shall not be invoiced until the item is installed.

8. Payment for off-site storage is normally reserved for sensitive or very large pieces of equipment that in ENGINEER's opinion would not be practical to have stored on the site. Payment for off-site stored items shall be limited to 75% of the invoiced value of the item, less Contract retainage. CONTRACTOR shall reimburse OWNER the cost of inspecting off-site stored items. When off-site storage is approved, CONTRACTOR shall provide Insurance Certificates and Document of Ownership to OWNER.

9. Payment for PLC and SCADA programming shall be limited to 75% of the invoiced time spent, less Contract retainage.

To allow this payment value, programming must be completed by area and system. CONTRACTOR must provide the following:

- a. Signed certification by an officer of CONTRACTOR and electrical subcontractor that work has been completed.
- b. Ladder diagram or function block dump with complete descriptive narrative in PDF format.
- c. Database cross reference report for graphics (if applicable).
- d. I/O partition list.
- e. Smart I/O (DeviceNet, profibers, control net, Ethernet I/O, field bus, etc.) configuration report.
- f. Processor configuration report.
- g. Subroutine listing.

10. By submitting an Application for Payment based in whole or in part on furnishing equipment or materials, CONTRACTOR certifies that such equipment and materials are compliant with Build America, Buy America requirements. Manufacturer's Certification letter for materials satisfy this requirement.

SC-15.01.D Payment Becomes Due

Delete Paragraph 15.01.D.1 and insert the following in its place:

1. Within 10 days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, OWNER will (subject to the provisions of Paragraph 15.01.E) approve and submit the Application for Payment to the Illinois Environmental Protection Agency for approval. Payment should be made by that agency within 45 days subject to their internal procedures and reviews. OWNER shall promptly disburse payment to CONTRACTOR after receipt of payment from agency.

SC-15.02 CONTRACTOR's Warranty of Title

Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by OWNER" and inserting "no later than the time of payment by OWNER."

SC-15.03 Substantial Completion

Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by ENGINEER, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by CONTRACTOR to OWNER. If CONTRACTOR does not pay, or the parties are unable to agree as to the amount owed, then OWNER may impose a reasonable set-off against payments due under this Article 15.

SC-15.08 Correction Period

Add the following new Paragraph 15.08.H:

H. If Substantial Completion for the entire work is never requested by CONTRACTOR, the correction period shall commence after final payment.

SC-16.02 OWNER May Terminate for Cause

Add the following new paragraphs immediately after Paragraph 16.02.B.2:

3. complete the Work as OWNER may deem expedient at the expense of CONTRACTOR and surety;
4. apply the amounts retained from partial payments to the completion of the Work;
- and
5. authorize the surety to complete the steps in Paragraphs 16.02.B.1 through 4.

SC-16.03 OWNER May Terminate for Convenience

Add the following paragraph after Paragraph 16.03.B:

C. CONTRACTOR shall require similar provisions contained in Paragraph 16.03 in each of its subcontracts to protect CONTRACTOR from claims by Subcontractors arising from OWNER's termination for convenience, or to minimize claims by such subcontractors. The remedy provided to CONTRACTOR under this Paragraph 16.03 shall be CONTRACTOR's sole remedy in the event of termination for convenience by OWNER.

END OF SECTION



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Insurance Agency	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED Contractor	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID #:	
	INSURER(S) AFFORDING COVERAGE	
	NAIC #	
	INSURER A : Insurance Company	
	INSURER B :	
	INSURER C :	
	INSURER D :	
INSURER E :		
INSURER F :		

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
☒	GENERAL LIABILITY	☒					EACH OCCURRENCE	\$ 1,000,000
	☒ COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
	☐ CLAIMS-MADE ☒ OCCUR						MED EXP (Any one person)	\$
							PERSONAL & ADV INJURY	\$ 1,000,000
							GENERAL AGGREGATE	\$ 2,000,000
							PRODUCTS - COMP/OP AGG	\$ 2,000,000
								\$
							GEN'L AGGREGATE LIMIT APPLIES PER:	
☐ POLICY ☒ PRO-JECT ☐ LOC								
☒	AUTOMOBILE LIABILITY	☒					COMBINED SINGLE LIMIT (Ea accident)	\$ 2,000,000
	☒ ANY AUTO						BODILY INJURY (Per person)	\$
	☐ ALL OWNED AUTOS						BODILY INJURY (Per accident)	\$
	☐ SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident)	\$
	☐ HIRED AUTOS							
	☐ NON-OWNED AUTOS						EACH CLAIM	\$ 1,000,000
							GENERAL AGGREGATE	\$ 2,000,000
							UNMANNED AERIAL VEHICLE	
☐	UMBRELLA LIAB ☒ OCCUR	☒					EACH OCCURRENCE	\$ 5,000,000
	☐ EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	\$ 5,000,000
							EACH CLAIM	\$ 2,000,000
	PROFESSIONAL LIABILITY						ANNUAL AGGREGATE	\$ 5,000,000
☐	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	☐	N/A				☒ WC STATU-TORY LIMITS ☐ OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)						E.L. EACH ACCIDENT	\$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	\$ 1,000,000
☐	BUILDERS RISK POLLUTION LIABILITY						SEE SC-6.04	
	EACH CLAIM						\$ 2,000,000	
							GENERAL AGGREGATE	\$ 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Eastern and Western Receiving Stations, Contract 2-2025, City of Crest Hill, Illinois
The City of Crest Hill and Strand Associates, Inc. are additional insured with respect to General Liability, Automobile Liability, Pollution Liability, Unmanned Aerial Liability, and Excess/Umbrella Liability. The City of Crest Hill is an insured with respect to Builder's Risk policy. In addition, see attached Additional Insured Endorsements for the General Liability and Automobile Liability policies.

CERTIFICATE HOLDER **CANCELLATION**

City of Crest Hill 20600 City Center Blvd Crest Hill, IL 60403 (Provide separate certificate to each party.) Strand Associates, Inc. 1170 South Houbolt Road Joliet, IL 60431	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

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SPECIFICATIONS

SECTION 01 11 00

SUMMARY OF WORK

PART 1—GENERAL

1.01 DIVISION ONE

- A. The requirements of Division 01 apply to all sections of the Contract.

1.02 PROJECT SCOPE

- A. CONTRACTOR shall provide all items, articles, materials, operations or methods mentioned or scheduled on the Drawings or herein specified: including all labor, supervision, equipment, incidentals, taxes, and permits necessary to complete the Work as described within the Contract Documents. CONTRACTOR shall install all items provided by OWNER as mentioned or scheduled on the Drawings or herein specified.

1.03 CONTRACT DOCUMENTS—INTENT AND USE

- A. Intent of Documents:
 - 1. Singular notations and Specifications shall be considered plural where application is reasonably inferred.
 - 2. Mention or indication of extent of work under any division or Specification section is done only for convenience of CONTRACTOR and shall not be construed as describing all work required under that division or section.
 - 3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. CONTRACTOR may not rely upon this listing for determination of scope of work. Other sections of the Specifications not referenced in individual sections shall apply as required for proper performance of the Work.
 - 4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to CONTRACTOR.
 - 5. Symbols for various elements and systems are shown on the Drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from ENGINEER.
- B. Use of Documents:
 - 1. CONTRACTOR shall examine all Specifications and Drawings for the Work, including those that may pertain to Work CONTRACTOR does not normally perform with its own forces.
 - 2. CONTRACTOR shall use all of the Project Drawings and Specifications:
 - a. For a complete understanding of the Project.
 - b. To determine the type of construction and systems required.
 - c. For coordination with other contractors.
 - d. To determine what other work may be involved in various parts or phases.
 - e. To anticipate and notify others when work by others will be required.
 - f. And all other relevant matters related to the project.

3. CONTRACTOR is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its Work as may be shown or inferred by the entire set of Project Drawings and Specifications.

1.04 CONTRACTOR USE OF SITE

A. General:

1. The "area of the site" referred to in these Specifications shall be as shown on the Drawings. If the "area of the site" is not shown, OWNER's property lines, the Project right-of-way and/or any easements obtained for the Project shall be considered the "area of the site."
2. Construction activities shall be confined within the "area of the site" limits.
3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

B. Parking and Deliveries:

1. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.
2. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas as shown on the Drawings.
3. Access to the site for delivery of construction material or equipment shall be at locations shown on the Drawings.

1.05 EXISTING SERVICES, OVERHEAD UTILITIES, AND UNDERGROUND FACILITIES INCLUDING STRUCTURES

- A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security will not be permitted unless specifically indicated otherwise. Provide temporary facilities to maintain services.
- B. If deemed necessary by OWNER, such work shall be accomplished after OWNER's normal office hours.
- C. Work shall not commence until all labor, materials, and equipment are available so Work can continue without interruption or delay.
- D. Should uncharted or incorrectly charted services or Underground Facilities be encountered during installation, notify OWNER and consult with utility owner immediately.
- E. Cooperate with OWNER and utility companies in keeping respective services and Underground Facilities in operation and repair any damage.
- F. CONTRACTOR shall not interrupt existing services and Underground Facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

- G. Any accidental interruption of services and Underground Facilities shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.
- H. Prior to any excavation, demolition, or drilling on site, CONTRACTOR shall contact owners of the Underground Facilities in and near the construction area of the intent to excavate, demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact "JULIE" (811 or 1-800-892-0123). CONTRACTOR shall be aware that not all owners participate in "JULIE." A call to this agency shall not absolve CONTRACTOR of the requirements for contacting owners of all Underground Facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to "JULIE" and other owners for the notification which shall not be less than the minimum advance notification required.
- I. Locations and elevations of services and Underground Facilities as shown on the Drawings are approximate. It shall be CONTRACTOR's responsibility to determine their exact location when in their vicinity. To this end, CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of services and Underground Facilities can be determined. CONTRACTOR shall include in the Contract Price any costs for temporary or permanent relocations of such services and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.
- J. Where potential grade conflicts might occur with existing services and Underground Facilities, CONTRACTOR shall uncover such services and Underground Facilities sufficiently in advance of construction so that elevations may be determined to allow any necessary adjustments to be made.
- K. CONTRACTOR shall coordinate with overhead utility companies prior to the Work. CONTRACTOR shall provide all necessary temporary and permanent support relocation or temporary and permanent restraint to maintain overhead utilities in service.
- L. CONTRACTOR shall keep an accurate and complete record of all such services and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.
- M. CONTRACTOR shall inspect all services and Underground Facilities for condition and soundness. Unsound conditions shall be reported to OWNER immediately after exposing. CONTRACTOR shall not proceed with the Work until the service or facility owner has been notified. Service or facility owner shall then be given time to inspect and correct, if required, the service or Underground Facility. CONTRACTOR may make claim under the provisions of Articles 11 and 12 of the General Conditions should CONTRACTOR feel a price or time adjustment is justified.
- N. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing services and Underground Facility encountered shall be paid for by CONTRACTOR.
- O. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing services and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is required to perform additional Work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

1.06 PROTECTION OF WORK AND IMPROVEMENTS

- A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.
- B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.
- C. CONTRACTOR shall keep property, existing improvements, and the Work including structures, mains, fittings, and accessories free from dirt and foreign matter at all times.
- D. CONTRACTOR shall provide temporary plugging of openings, holes, and pipe ends that are existing or that CONTRACTOR has installed.
- E. Property, improvements, and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.
- F. If more than one contractor is responsible, the cost shall be shared. ENGINEER will determine responsibility for damages. All repair and replacement methods shall be acceptable to OWNER.
- G. CONTRACTOR is cautioned that existing public and private streets, alleyways, and roads may not hold up to typical construction traffic or activities. CONTRACTOR shall repair or replace streets, alleyways, roads, and shoulders damaged by its construction activities to their original condition at CONTRACTOR's expense.

1.07 AVAILABILITY OF LANDS

- A. Easements were not obtained for this Project. CONTRACTOR shall confine its operations, equipment and storage areas to the lands and rights-of-way in which the Project is to be located. CONTRACTOR may enter into written agreements with property owners for use of other lands during construction. Copies of such agreements shall be provided to OWNER.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 29 00

CONTRACT CONSIDERATIONS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Cash Allowances.
 - 2. Measurement and Payment–Lump Sum.

1.02 CASH ALLOWANCES

- A. See Paragraph 13.02 of the General Conditions for costs to be included in allowances.
- B. Refer to sections of the specifications identified in the Bid Form for specific information on use of cash allowances.
- C. The Bid shall include the amount equal to the specified quantity times the unit price.

1.03 MEASUREMENT AND PAYMENT–LUMP SUM

- A. Payment for Lump Sum projects will be based on the accepted schedule of values for the project.
- B. An acceptable schedule of values will include the following features:
 - 1. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall be subdivided as necessary by specification section and work area.
 - 2. Identify each line item with the number and title of the respective Specification Section.
 - 3. For each major line item list sub-values of major products or operations under the item.
 - 4. For the various portions of the work:
 - a. Each item shall include a directly proportional amount of CONTRACTOR's overhead and profit.
 - b. For items on which progress payments will be requested for stored materials, break down the value into:
 - (1) The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by ENGINEER.
 - (2) The total installed value.
 - 5. The sum of all values listed in the schedule shall equal the total Contract Sum.
 - 6. Schedule shall include a separate listing of general items such as bonds, insurance, mobilization, demobilization, field supervision, record documents, and cash allowances.
- C. Once a schedule of values is accepted, it shall not be revised, except for changes associated with subsequently executed change orders.
- D. No separate measurement for payment will be performed for Lump Sum Work.

- E. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.
- F. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.
- G. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Lump Sum Bid.
- H. Some technical specification sections may include payment provisions. These provisions are in addition to the provisions of this section which apply to all of the Work.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 31 00

COORDINATION, FIELD ENGINEERING, AND MEETINGS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Coordination.
 - 2. Field Engineering.
 - 3. Progress Meetings.
 - 4. Preinstallation Meeting.
 - 5. Preconstruction Video.
 - 6. Preinstallation Videoconference.

1.02 COORDINATION

- A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to provide an efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. See Section 01 11 00—Summary of Work for specific construction sequence.
- B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with building utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
- C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, except as otherwise indicated, CONTRACTOR shall conceal pipes, ducts, and wiring within the construction and coordinate locations of fixtures and outlets with finish elements.
- E. CONTRACTOR shall coordinate completion and cleanup of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.
- F. After OWNER occupancy of premises, CONTRACTOR shall coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents to minimize disruption of OWNER's activities.

1.03 FIELD ENGINEERING

- A. CONTRACTOR shall locate and protect property stakes, legal survey monuments, benchmarks, and survey control and reference points. CONTRACTOR shall pay for replacement of disturbed property stakes and legal survey monuments by a Registered Land

Surveyor acceptable to OWNER and for replacement of benchmarks and survey control and reference points provided by ENGINEER.

- B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels utilizing recognized engineering survey practices.
- C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.
- D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.
- E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.
- F. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work and will be held responsible for any error resulting from its failure to exercise such precaution.

1.04 PROGRESS MEETINGS

- A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR. Interval will generally be monthly.
- B. CONTRACTOR's project manager, job superintendent, major subcontractors, and suppliers shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.
- C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting.
- D. CONTRACTOR shall also provide the following information in written form at each meeting.
 - 1. Construction progress, including:
 - a. Activities completed this reporting period.
 - b. Activities in progress this reporting period.
 - c. Activities scheduled to commence this reporting period.
 - 2. Description of problem areas.
 - 3. Current and anticipated delays.
 - a. Cause of the delay.
 - b. Corrective action and schedule adjustments to correct the delay.
 - c. Impact of the delay on other activities, on milestones, and on completion dates.
 - 4. Changes in construction sequence.
- E. ENGINEER will prepare and distribute minutes to all attending parties.

1.05 PREINSTALLATION MEETING

- A. When required in individual specification sections, CONTRACTOR shall convene a preinstallation meeting at Work Site prior to commencing Work of the section.
- B. CONTRACTOR shall require attendance of parties directly affecting or affected by work of the specific section.
- C. CONTRACTOR shall notify ENGINEER seven days in advance of meeting date.
- D. CONTRACTOR shall prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation, and installation procedures.
 - 2. Review coordination with related work.
- E. CONTRACTOR shall record minutes and distribute copies to participants and those affected by decisions made within one week after meeting.

1.06 PRECONSTRUCTION VIDEO

- A. Prior to mobilization at the site, CONTRACTOR shall furnish to ENGINEER a high-resolution color audio-video recording of all planned construction areas, including but not limited to streets, driveways, sidewalks, curbs, fencing, visible utilities, retaining structures, and adjacent building structures. The purpose of the video is to document existing conditions and to provide a fair measure of required restoration. Care should be taken to record all existing conditions that exhibit deterioration, imperfections, structural failures, or situations that would be considered substandard.
- B. The video recording shall be performed by a professional firm specializing in audio-video work. The videos shall be high quality, color, and high-resolution. The video shall be provided in a digitized format that is supported by Window Media Player. The videos shall be provided via DVD, thumb drive, or other media requested by OWNER. Temporary lighting shall be provided as necessary to properly video areas where natural lighting is insufficient (indoors, shadows, etc.). The videos shall include an audio soundtrack, to provide the following information:
 - 1. Detailed description of location being viewed referenced to Contract Drawings (i.e., station number, building designation, pipeline route, etc.).
 - 2. Direction (N, S, E, W, looking up, looking down, etc.) of camera view.
 - 3. Date, time, temperature, and environmental conditions at time of video.
- C. Video recording shall not be performed during inclement weather or when the ground is covered partially or totally with snow, ice, leaves, etc.
- D. As many videos as are necessary to satisfy the requirements of this section shall be prepared. The original videos shall be submitted to ENGINEER accompanied by a detailed log of the contents of each video. The log should include location descriptions to facilitate the quick location of information contained in the videos. The videos will be maintained by ENGINEER during construction and may be viewed at any time by CONTRACTOR upon request. Upon final acceptance, the videos will become permanent property of OWNER.
- E. All costs associated with this shall be included in the Lump Sum Bid for this Work.

1.07 PREINSTALLATION VIDEOCONFERENCE

- A. When required in Section 26 09 00—Controls and Instrumentation, CONTRACTOR shall convene a preinstallation videoconference prior to the on-site functional acceptance testing.
- B. CONTRACTOR shall require attendance of CONTRACTOR, System Supplier, Division 26 contractor, OWNER, ENGINEER, and all other parties responsible for the equipment and controls schedules for on-site functional acceptance testing.
- C. CONTRACTOR shall arrange videoconference two months prior to the anticipated on-site functional acceptance testing. CONTRACTOR shall arrange an additional videoconference one month prior to the date for on-site functional acceptance testing of each group of equipment.
- D. Additional requirements for the videoconference can be found in Section 26 09 00—Controls and Instrumentation.

PART 2—PRODUCTS

NOT APPLICABLE

PART 3—EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
 - 2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
 - 3. The type of submittal requirements specified in this section include construction progress schedule, submittal schedule, shop drawings, product data, samples, maintenance manuals, and other miscellaneous work-related submittals.
- B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these Specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 7 of the General Conditions.
- C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

1.02 IDENTIFICATION OF SUBMITTALS

- A. CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:
 - 1. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
 - 2. Name and location of project and identification number.
 - 3. Drawing number and Specifications section number to which the submittal applies.
 - 4. Include the date of each submittal or resubmittal.

1.03 GROUPING OF SUBMITTALS

- A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.
- B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

1.04 TIMING OF SUBMITTALS

- A. CONTRACTOR shall make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approval, for possible revision and resubmittal, and for placing orders and securing delivery.

- B. The review period for submittals that are received after 3 P.M. shall commence on the following business day.

1.05 CONSTRUCTION PROGRESS AND SUBMITTAL SCHEDULES

- A. Submit preliminary schedules within 10 days of the Effective Date of the Contract.
- B. Revise schedules incorporating any comments provided at the schedule review conference required in GC-2.05 and resubmit.
- C. As a minimum, the construction progress schedule shall consist of a horizontal bar chart with a separate line for each major portion of Work or operation, identifying first workday of each week.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float (defined as the amount of time an activity can be delayed without impacting completion deadlines), and duration for each activity. Identify activities that are on the critical path.
- E. Include line items for milestones (if any), Substantial, and Final Completion.
- F. Submit updated schedules with each Application for Payment, identifying changes since previous version.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

- A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.
- B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.
- C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.
- D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 50% completion of the Work. Applications for payment beyond 50% of the Contract amount will not be recommended for payment until all shop drawings are submitted, including color hard copies if requested by OWNER, or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.

- E. CONTRACTOR shall submit shop drawings following the electronic submittal procedure described below.
- F. Shop drawings submitted to ENGINEER will be reviewed and stamped "Approved," "Approved as Noted," "Approved as Noted-Resubmit," or "Not Approved." CONTRACTOR shall resubmit shop drawings stamped "Approved as Noted-Resubmit" and "Not Approved," and will continue this process until shop drawings are stamped "Approved" or "Approved as Noted." If Drawings are stamped "Approved as Noted-Resubmit," fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped "Approved" or "Approved as Noted."
- G. If shop drawings are stamped "Approved as Noted" or "Approved as Noted-Resubmit" and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR's position.
- H. All shop drawings used for construction site activities shall bear the "Approved" or "Approved as Noted" stamp of ENGINEER.
- I. Electronic Submittal Procedures:
 - 1. Summary:
 - a. Shop drawing and product data submittals shall be transmitted to ENGINEER in electronic (PDF) format using Submittal Exchange, or equal, a website service designed specifically for transmitting submittals between construction team members, or equal.
 - b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
 - c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
 - 2. Procedures:
 - a. CONTRACTOR shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
 - b. CONTRACTOR shall transmit each submittal to ENGINEER using the approved website service.
 - c. ENGINEER review comments will be made available on the approved website for downloading. CONTRACTOR will receive email notice of completed review.
 - d. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of CONTRACTOR.
 - e. Electronically submitted shop drawings shall follow the following format:
 - (1) Filenames for the shop drawing submittals shall follow a XX XX XX.YYY-Z. Description convention where XX XX XX is the specification section number, YYY is the submittal number, Z is the resubmittal number, and description is a short description of what the submittal includes. Submittals shall be consecutively numbered in direct sequence of submittal. Resubmittals shall be consecutively numbered with the first submittal numbered with a -0 and the first resubmittal numbered with a -1. Example file name: 03 20 00.016-1. Structure 10 Concrete Reinforcement. This would be the first revision of the sixteenth submittal and contain information on concrete reinforcement.

- (2) All files shall be delivered in PDF format with a minimum resolution of 300 dpi unless otherwise requested by ENGINEER. Scanned in material shall be scanned in color and any markings by CONTRACTOR shall be made in red. Pages shall be rotated to the appropriate position for easy reading on a computer monitor such that the majority of text is vertical.
- (3) Files shall be delivered without security features activated.
- (4) Shop Drawings shall be uploaded as individual files. Files combined into a zip drive are not acceptable. All pages of one submittal should be contained in one file.
- (5) The file shall open to a cover page containing, at a minimum, the following information:
 - (a) CONTRACTOR's stamp.
 - (b) Name, e-mail, and telephone number of the individual who may be contacted for further information.
 - (c) Project number.
 - (d) Submittal number.
 - (e) Submission date, if resubmittal, all previous submission dates.
 - (f) Index detailing contents and the total number of pages in the submittal.
- f. Once a shop drawing has been "Approved" or "Approved as Noted," CONTRACTOR shall provide three hard color copies of the "Approved" or "Approved as Noted" shop drawings to ENGINEER. CONTRACTOR is responsible for the hard copy color replication of ENGINEER's "Approved" or "Approved as Noted" shop drawings for use by CONTRACTOR. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.
- 3. Costs:
 - a. CONTRACTOR shall include the full cost of the approved website service, project subscription in the Contract amount for the duration of the Project.
 - b. Internet Service and Equipment Requirements:
 - (1) Email address and Internet access at CONTRACTOR's main office.
 - (2) Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.
- J. CONTRACTOR is fully responsible for obtaining any and all copyright permission associated with conversion of shop drawing information to electronic format.
- K. Shop drawings shall include verification that the item meets applicable codes and standards.

1.07 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, CONTRACTOR shall submit accurate color charts and pattern charts to ENGINEER for OWNER's review and selection.
- B. Unless all available colors and patterns have identical wearing capabilities and are identically suited for the installation, CONTRACTOR shall completely describe the relative capabilities of each.

1.08 SAMPLES AND FIELD MOCKUPS

- A. CONTRACTOR shall provide samples and field mockups where noted or specified.
- B. Samples are physical examples which illustrate materials, equipment, or workmanship and establish standards by which the work will be judged.
- C. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product and full range of color, texture, and pattern.
- D. Samples shall have labels firmly attached, bearing the following information:
 - 1. Name of project.
 - 2. Description of product and finish.
 - 3. Name of CONTRACTOR.
 - 4. Trade name and number of product.
 - 5. Standards met by the product.
- E. Approval of samples must be obtained prior to proceeding with any work affected by material requiring sample approval.
- F. Samples, unless otherwise noted, become the property of OWNER.
- G. In situations specifically approved by ENGINEER, the retained sample may be used in the construction as one of the installed items.
- H. Field Mockups:
 - 1. CONTRACTOR shall erect field mockups at the project site in a location acceptable to ENGINEER and OWNER.
 - 2. When accepted by ENGINEER, the mockup will become the basis for comparison of the actual work.
 - 3. Remove mockup at conclusion of the work if it was not incorporated into the work.

1.09 PRODUCT DATA

- A. CONTRACTOR shall provide product data as required to supplement shop drawings.
- B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.
- C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.
- D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.
- E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.

- F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

1.10 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by ENGINEER.
- B. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data and resubmit as specified for initial submittal.
 - 2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.

1.11 MANUFACTURER'S DIRECTIONS

- A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.
- B. Wherever Specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

1.12 MAINTENANCE MANUAL

- A. Prior to 75% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER two complete color hard copies of a maintenance manual for all equipment furnished. Applications for payment beyond 75% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.
- B. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventative maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and startup procedures and, where applicable, test data and curves.
- C. All sheets shall have reduced dimensions as described for shop drawings, and shall be furnished in 3-ring binders or 3-tab report covers.
- D. CONTRACTOR is responsible for producing an electronic version of the Equipment Operations and Maintenance (O&M) Manuals Manual. The Electronic Equipment O&M Manual shall be delivered in Portable Document Format (PDF). The entire manual may be converted to PDF via scanning or other method of conversion. Drawings or other graphics must be converted to PDF format and made part of the PDF document. CONTRACTOR shall provide all Equipment O&M Manuals in the electronic format as defined below.
- E. The filename for the Equipment O&M Manual submittal will be provided with the request for final Equipment O&M Manuals. Filenames use the "eight dot three" convention

(XX XX XX_YY.PDF) where XX XX XX is the specification section number and YY is an ID number. No one file shall be larger than 10 MB. If technical problems require that the submittal be divided into more than one file, a letter extension shall be added to the end of each filename.

- F. The number of files shall be kept to a minimum. Equipment O&M Manuals that span more than one file shall have the final Bookmark "Return to Table of Contents" which shall take the User to the first file on the Equipment O&M Manual.
- G. All text (word processed), spreadsheets, and electronic graphics shall be delivered in portable document format (*.PDF). The resolution of all scanned images shall be a minimum of 300 dpi unless otherwise requested by ENGINEER. Scanned images shall be processed with the "original image with hidden text" option (Adobe Acrobat 6 or higher). This results in a clear image and provides for optical character recognition (OCR) and word search functionality. Graphical files shall be fully searchable. All submittals must be indexed with the Adobe Catalog feature. Placement and structure of index files shall be in accordance with Adobe's recommendations to minimize problems when transferring files. Successful searches for words or strings in the PDF document shall demonstrate proof of OCR.
- H. Rotate pages viewed in landscape to the appropriate position for easy reading on a computer monitor.
- I. Bookmarks shall be created in the navigation frame for each entry in the Table of Contents. Three levels deep is usually enough (i.e., "Chapter," "Section," "Subsection"); however, complex submittals like instrumentation and electrical may be required at the discretion of ENGINEER. When setting bookmarks for Chapter level heading, the page shall be displayed at Full Page. Section and Subsection level heading pages shall be displayed as a magnified view. Bookmarks shall be displayed as subordinate to other bookmarks in their hierarchy set so that only the Chapter level headings are displayed.
- J. Thumbnails shall be generated and embedded in each PDF file.
- K. Files shall be delivered without Security features activated. Password protected files will be unacceptable.
- L. The opening view for PDF files shall be set as follows:
 - 1. Initial View: Bookmarks and Page
 - 2. Magnification: Fit In Window
 - 3. Page Layout: Single Page
- M. The file shall open to the cover page of the Equipment O&M Manual with bookmarks to the left. The first bookmark shall be the name of Equipment O&M Manual.
- N. O&M Manual PDFs shall be delivered electronically.
- O. CONTRACTOR shall reprocess any portion of the document that does not view or print to OWNER's satisfaction.
- P. CONTRACTOR is fully responsible for obtaining any and all copyright permissions associated with conversion of this information to electronic format.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. OSHA Requirements.
 - 2. 35 Ill. Adm. Code 652.
 - 3. 35 Ill. Adm. Code 1100.
 - 4. Roadway Limits.
 - 5. Permits.
 - 6. Wage Rates.
 - 7. Bid America, Buy America Requirements.

1.02 OSHA REQUIREMENTS

- A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act."

1.03 35 ILL. ADM. CODE 652

- A. CONTRACTOR shall comply with 35 Ill. Adm. Code 652 during the project and shall use protective coatings personnel to carry out corrosion prevention and mitigation methods and use inspectors so that best practices and standards are adhered to.

1.04 35 ILL. ADM. CODE 1100

- A. CONTRACTOR shall comply with 35 Ill. Adm. Code 1100 when disposing of clean construction or demolition debris (CCDD) or uncontaminated soil at a CCDD or uncontaminated soil fill operation.

1.05 ROADWAY LIMITS

- A. CONTRACTOR shall comply with roadway weight restrictions including seasonal weight restrictions.

1.06 PERMITS

- A. The following permit is being obtained by OWNER and will be provided to the awarded CONTRACTOR when received: Illinois Environmental Protection Agency Permit to Construct.
- B. The permit is included as an attachment to this division. CONTRACTOR shall comply with all provisions of this permit and shall be responsible for notifications as required by this permit. CONTRACTOR shall obtain all other permits required for the Work. Where the requirements of any permit is more restrictive than the Drawings or the Specifications, the permit requirements shall govern.

- C. A building permit will be required from OWNER. However, OWNER will waive fees associated with the permit.
- D. Any permits required for dewatering operations shall be obtained and paid for by CONTRACTOR.

1.07 WAGE RATES

- A. CONTRACTOR and any subcontractor shall pay all laborers, workers, and mechanics performing work under the Contract not less than the prevailing wage rates adopted by OWNER or determined by the court on review and filed with the Secretary of State in Springfield. A copy of the Schedule of Prevailing Wage Rates is attached at the end of Division 01.
- B. CONTRACTOR shall keep or cause to be kept a record of employees and wages paid as required by the Prevailing Wage Act (820 ILCS 130/1-12). CONTRACTOR shall also require each subcontractor employed on the project to keep these same records. In accordance with Illinois Public Act 94-0515, CONTRACTOR shall submit certified payroll records on a monthly basis to OWNER, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that CONTRACTOR is aware that filing records he or she knows to be false is a Class B misdemeanor.
- C. The certified payroll records shall include for every worker employed on the project the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, number of hours worked each day, and starting and ending time of work each day.
- D. If at the time this Contract is executed, or if during the term of this Contract, there is excessive unemployment in Illinois as defined in the Employment of Illinois Workers on Public Works Act, 30 ILCS 570, as two consecutive months of unemployment exceeding 5%, CONTRACTOR agrees to employ a work force that is comprised of at least 90% Illinois laborers. An "Illinois laborer" is defined as any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident.
- E. CONTRACTOR shall pay wages to each laborer and mechanic at a rate not less than the minimum wages specified in the current wage determination in accordance with the provisions of the Davis-Bacon Act. Refer to the Federal Wage Rates attached at the end of Division 01.
- F. The higher wage rate determination shall apply.
- G. CONTRACTOR shall adhere to the Davis-Bacon and Related Acts regulations.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements. For iron and steel products, references to AIS requirements are acceptable and reciprocal with BABA for

such items. Certification letters (sample included in Section 00 49 60) shall include the following at a minimum:

1. Identification of the product.
 2. City and State where the product was manufactured.
 3. Reference to OWNER and/or project.
 4. Signature of authorized manufacturer employee.
 5. Reference to current BABA requirements. Reference to Infrastructure Investment and Jobs Act or Bipartisan Infrastructure Law are also acceptable.
- B. The BABA Act of 2021 does grant the possibility of waivers and exclusions if certain conditions are met. Products that qualify for the BABA national de minimus waiver, dated October 2022, cumulatively may comprise no more than five percent of the total project cost and is not additive with the existing American Iron and Steel national de minimus waiver.
- C. CONTRACTOR shall provide required BABA documentation prior to installation of regulated iron and steel product.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 42 00

REFERENCE STANDARDS AND DEFINITIONS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Reference Standards:
 - a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
 - b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
 - c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.
 - 2. Definitions:
 - a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
 - b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
 - c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.
- B. Related Work Described Elsewhere: The specific naming of codes or standards occurs on the Drawings and in other sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Familiarity with Pertinent Codes and Standards:
 - 1. It is CONTRACTOR's responsibility to verify the requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.
 - 2. When required by individual sections of these Specifications, CONTRACTOR shall obtain a copy of each pertinent code or standard and maintain the copies at the job site during submittals, planning, and progress of the Work until Substantial Completion of the Work is attained.
- B. Overlapping or Conflicting Requirements:
 - 1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different

or conflicting minimums or levels of quality, the most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.

2. Refer all uncertainties to ENGINEER for decision before proceeding.

1.03 REFERENCE STANDARDS

- A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.
- B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.
- C. Nonreference standards are hereby defined to have no particular applicability to the Work except as a general measurement of whether the Work complies with standards recognized in the construction industry.
- D. Reference standards and codes listed in these Specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA Aluminum Association
1525 Wilson Boulevard, Arlington, VA 22209
2. AAMA American Architectural Manufacturer's Association
1827 Walden Office Square Suite 550, Schaumburg, IL 60173-4268
3. AASHTO American Association of State Highway & Transportation Officials
444 North Capitol Street NW Suite 249, Washington, DC 20001
4. ACI American Concrete Institute
38800 Country Club Drive, Farmington Hills, MI 48331-3439
5. AI Asphalt Institute
2696 Research Park Drive, Lexington, KY 40511-8480
6. AISC American Institute of Steel Construction
One East Wacker Drive Suite 700, Chicago, IL 60601-1802
7. AISI American Iron and Steel Institute
25 Massachusetts Avenue NW Suite 800, Washington, DC 20001
8. ANSI American National Standards Institute
25 West 43rd Street, New York, NY 10036

9. APA American Plywood Association
7011 South 19th, Tacoma, WA 98466-5333
10. API American Petroleum Institute
1220 L Street NW, Washington, DC 20005-4070
11. ARI Air-Conditioning & Refrigeration Institute
4100 North Fairfax Drive Suite 200, Arlington, VA 22203
12. ASHRAE American Society of Heating, Refrigerating, and Air Conditioning Engineers
1791 Tullie Circle NE, Atlanta, GA 30329
13. ASME American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990
14. ASSE American Society of Sanitary Engineering
901 Canterbury Suite A, Westlake, OH 44145
15. ASTM ASTM International
100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
16. AWI Architectural Woodwork Institute
46179 Westlake Drive Suite 120, Potomac Falls, VA 20165-5874
17. AWWA American Water Works Association
6666 West Quincy Avenue, Denver, CO 80235
18. AWS American Welding Society
8669 Doral Boulevard Suite 130, Doral, FL 33166
19. AWWA American Water Works Association
6666 West Quincy Avenue, Denver, CO 80235
20. BHMA Builder's Hardware Manufacturers Association
355 Lexington Avenue 15th floor, New York, NY 10017
21. BIA Brick Industry Association
1850 Centennial Park Drive Suite 301, Reston, VA 20191
22. CRSI Concrete Reinforcing Steel Institute
9333 North Plum Grove Road, Schaumburg, IL 60173
23. DOT U.S. Department of Transportation
1200 New Jersey Avenue, SE, Washington, DC 20590
24. EJMA Expansion Joint Manufacturers Association
25 North Broadway, Tarrytown, NY 10591

25. FM FM Global
FM Global Corporate Offices, 270 Central Avenue, Johnston, RI 02919
26. FTI Facing Tile Institute
Box 8880, Canton, OH 44711
27. GA Gypsum Association
6525 Belcrest Road Suite 480, Hyattsville, MD 20782
28. GANA Glass Association of North America
800 SW Jackson Street Suite 1500, Topeka, KS 66612-1200
29. ICC International Code Council
500 New Jersey Avenue NW 6th Floor, Washington, DC 20001
30. IES Illuminating Engineering Society
120 Wall Street, Floor 17, New York, NY 10005-4001
31. MIL Military Specifications
Naval Publications and Forms Center
5801 Tabor Avenue, Philadelphia, PA 19120
32. NAAMM National Association of Architectural Metal Manufacturers
800 Roosevelt Road Building C Suite 312, Glen Ellyn, IL 60137
33. NCMA National Concrete Masonry Association
13750 Sunrise Valley Drive, Herndon, VA 20171-4662
34. NECA NECA
National Electrical Contractors Association
3 Bethesda Metro Center Suite 1100, Bethesda, MD 20814
35. NEMA National Electrical Manufacturers Association
1300 North 17th Street Suite 1752, Rosslyn, VA 22209
36. NFPA National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
37. NIST National Institute of Standards and Technology
(U.S. Department of Commerce), 100 Bureau Drive, Stop 1070
Gaithersburg, MD 20899-1070
38. NRCA National Roofing Contractors Association
10255 West Higgins Road Suite 600, Rosemont, IL 60018-5607
39. NSF National Sanitation Foundation International
P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48113-0140

- | | |
|------------|--|
| 40. OSHA | Occupational Safety & Health Administration
200 Constitution Avenue NW, Washington, DC 20210 |
| 41. PCA | Portland Cement Association
5420 Old Orchard Road, Skokie, IL 60077 |
| 42. PCI | Prestressed Concrete Institute
200 West Adams Street Suite 2100, Chicago, IL 60606 |
| 43. SAE | Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive, Warrendale, PA 15096-0001 |
| 44. SDI | Steel Deck Institute
P.O. Box 25, Fox River Grove, IL 60021 |
| 45. SDI | Steel Door Institute
30200 Detroit Road, Westlake, OH 44145-1987 |
| 46. SIGMA | Sealed Insulating Glass Manufacturers Assoc.
401 North Michigan Avenue Suite 2400, Chicago, IL 60611 |
| 47. SJI | Steel Joist Institute
234 Cheves Street, Florence, SC 29501 |
| 48. SMACNA | Sheet Metal and Air Conditioning
Contractor's National Association
4201 Lafayette Center Drive, Chantilly, VA 20151-1219 |
| 49. SSPC | Society for Protective Coatings
40 24th Street 6th Floor, Pittsburgh, PA 15222-4656 |
| 50. TCA | Tile Council of America
100 Clemson Research Boulevard, Anderson, SC 29625 |
| 51. UL | Underwriters Laboratories
333 Pfingston Road; Northbrook, IL 60062 |

1.04 SUBMITTALS

- A. For OWNER's records, CONTRACTOR shall submit copies of permits, licenses, certifications, inspection reports, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.05 DEFINITIONS

A. Indicated:

1. The term "indicated" is a cross-reference to details, notes, or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in the Contract Documents.
2. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.

B. Approve (or Words of Similar Nature):

1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term "approve" will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 1.02.B of the General Conditions.
2. In no case will "approval" by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

C. Minimum Requirements:

1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
2. Actual work must comply with (or within specified tolerances) or exceed minimums.
3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.

D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1—GENERAL

1.01 SUMMARY

- A. Work Includes:
 - 1. Quality Assurance—Control of Installation.
 - 2. Tolerances.
 - 3. Manufacturers' Field Services and Reports.

1.02 QUALITY ASSURANCE—CONTROL OF INSTALLATION

- A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality.
- B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.
- D. CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to produce workmanship of specified quality.
- F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

- A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.
- B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.
- C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections or when requested by ENGINEER, CONTRACTOR shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, and quality of workmanship.

- B. CONTRACTOR shall submit qualifications of observer to ENGINEER 30 days in advance of required observations.
- C. CONTRACTOR shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. CONTRACTOR shall submit report in duplicate within 30 days of observation to ENGINEER for information.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Temporary Utilities.
 - 2. Temporary Stairs and Access.
 - 3. Temporary Support Facilities.
 - 4. Construction Sign.
 - 5. Removal of Temporary Facilities.
- B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.
- C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.
- D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
 - 1. Furnish all necessary labor and materials.
 - 2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
 - 3. Maintain such connections.
 - 4. Remove temporary installation and connection when no longer required.
 - 5. Restore services and sources of supply to proper operating conditions.

1.02 TEMPORARY UTILITIES

- A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.
- B. Temporary Electrical Services:
 - 1. CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Site. CONTRACTOR shall remove all temporary services when Project is complete.
 - 2. The temporary light and power system shall include temporary service poles, metering facilities, driven ground, fused main disconnect switch, panelboards, branch circuits, outlets and lamps, and the maintenance thereof.
 - 3. Construction areas, aisles, stairs, and ramps shall be illuminated to minimum 5 fc. Construction shops, storerooms, mechanical, and electrical rooms shall be illuminated to 10 fc. Offices shall be illuminated to 30 fc.
 - 4. Provide one general purpose, 20-ampere, 120-volt, single-phase, grounding-type receptacle outlet for every 1,000 feet of floor space. The maximum area of a 20-ampere, 120-volt lighting or power circuit shall not be greater than 200 feet from panelboard to

farthest outlet. All single-phase receptacle outlet circuit shall have approved ground-fault circuit interrupter protection.

5. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for electric current used for temporary lighting and power are to be paid by CONTRACTOR.
6. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

C. Weather Protection and Temporary Heat:

1. CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.
2. CONTRACTOR shall provide temporary heat within buildings, without cost to OWNER, from the time the buildings or portions thereof are enclosed until the Project is accepted or occupied by OWNER, whichever occurs first. The building work is to be heated during construction so a minimum temperature of 50°F is maintained at all times. Temporary heating equipment shall be properly vented.
3. Tanks that are constructed and existing tanks taken out of service as part of the Work shall be protected by CONTRACTOR from damage because of frost by insulating, enclosure, heating, or a combination of methods as required.
4. No permanent heating equipment shall be used on a temporary basis without express written permission by OWNER. Such approval, if given, shall not affect the guarantee period. If OWNER authorizes use of permanent heating equipment, CONTRACTOR shall pay all related energy costs until acceptance or occupancy (whichever occurs first) of the building by OWNER.

D. Temporary Water: CONTRACTOR shall supply its own water during construction. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements. Connection to the existing water system shall be coordinated with OWNER and shall meet all code requirements including disinfection and backflow prevention.

E. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

F. CONTRACTOR's and Subcontractor(s)' personnel shall refrain from smoking during excavation, laying pipe, backfilling, and other work at the Site which may involve potential contact with explosive vapors or gasoline products.

1.03 TEMPORARY STAIRS AND ACCESS

- A. CONTRACTOR shall provide and maintain all equipment such as temporary stairs, ladders, ramps, runways, chutes, and so on as required for proper execution of the Work. CONTRACTOR shall be responsible for providing its own scaffolds, hoists, etc.

- B. All such apparatus, equipment, and construction shall meet all requirements of OSHA, the labor laws, and other applicable State and local laws. Provide stairs with handrails. As soon as possible and where applicable, permanent stairs shall be installed.
- C. As soon as permanent stairs are created, provide temporary protective treads, handrails, and shaft protection.
- D. Provide barricades at hazardous locations, complete with signs, temporary general lighting, warning lights, and similar devices as required.

1.04 TEMPORARY SUPPORT FACILITIES

- A. CONTRACTOR shall provide whatever facilities and services which may be needed to properly support primary construction process and meet compliance requirements and governing regulations.
- B. CONTRACTOR shall not use permanent facilities except as otherwise indicated, unless authorized by OWNER.

1.05 CONSTRUCTION SIGN

- A. Furnish and erect a construction sign to be maintained and kept in place until completion of the Contract.
- B. CONTRACTOR shall furnish and install a professionally-constructed construction sign meeting the IEPA Using Signage to Improve Public Awareness of the State Revolving Fund (SRF) Project Public Notification Requirements packet and the requirements of the USEPA June 2015 Guidelines for Enhancing Public Awareness of State Revolving Fund Assistance Agreements memorandum located at the end of this section.
- C. Prior to construction of the sign, CONTRACTOR shall submit the sign design to ENGINEER to review conformance with BIL funding requirements.

1.06 REMOVAL OF TEMPORARY FACILITIES

- A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

Section 01 50 00-3

3894.061/2-2025

IEPA SRF PROJECT
PUBLIC NOTIFICATION REQUIREMENTS

Using Signage to Improve Public Awareness of the State Revolving Fund (SRF) Project Public Notification Requirements

The United States Environmental Protection Agency (USEPA) is implementing a nationwide initiative focused on enhancing public awareness of EPA financial assistance. Another goal of this initiative is to increase public awareness regarding improvements that municipalities make as a result of the SRF loan programs. Beginning October 1, 2015, all loan recipients in Illinois will be required to post a sign at the project site or make an equivalent public notification.

In order to comply with the new requirements, IEPA recommends loan recipients use one of the options described below. When selecting an option, please remember the goal is to communicate to the largest audience possible about the positive role that SRF funding is having on the community. This may include communicating in multiple languages. If a municipality has a significant number of non-English speaking citizens, notice should be made in the appropriate language(s). Each project and community is unique so the choice of communication method, information to include, graphics, and languages must be made locally.

Public notification should be issued after a construction contract is awarded for the project. The form located at the end of this document will then be submitted to IEPA along with supporting documentation as confirmation that the requirements have been met. No matter which method is chosen, costs related to the public notification are eligible for loan funding. A cost estimate may be submitted prior to receiving a loan agreement or it may be paid from loan contingency.

Option 1: Local Newspaper or Newsletter

Loan recipients may choose to publish in a local newspaper or newsletter as an effective way to reach the most area residents. If this option is chosen, there are a set of guidelines that must be included in the public notice or article.

Newspaper public notice or newsletter article must include the following:

- Name of the facility, project, and community served;
- The loan program that is being used for the project;
- The project is being funded either wholly or partially by the Agency;
- Brief description of project; and
- Brief listing of benefits project will bring to the community.

Public Notice

New Main Street Elevated Storage Tank in Austen

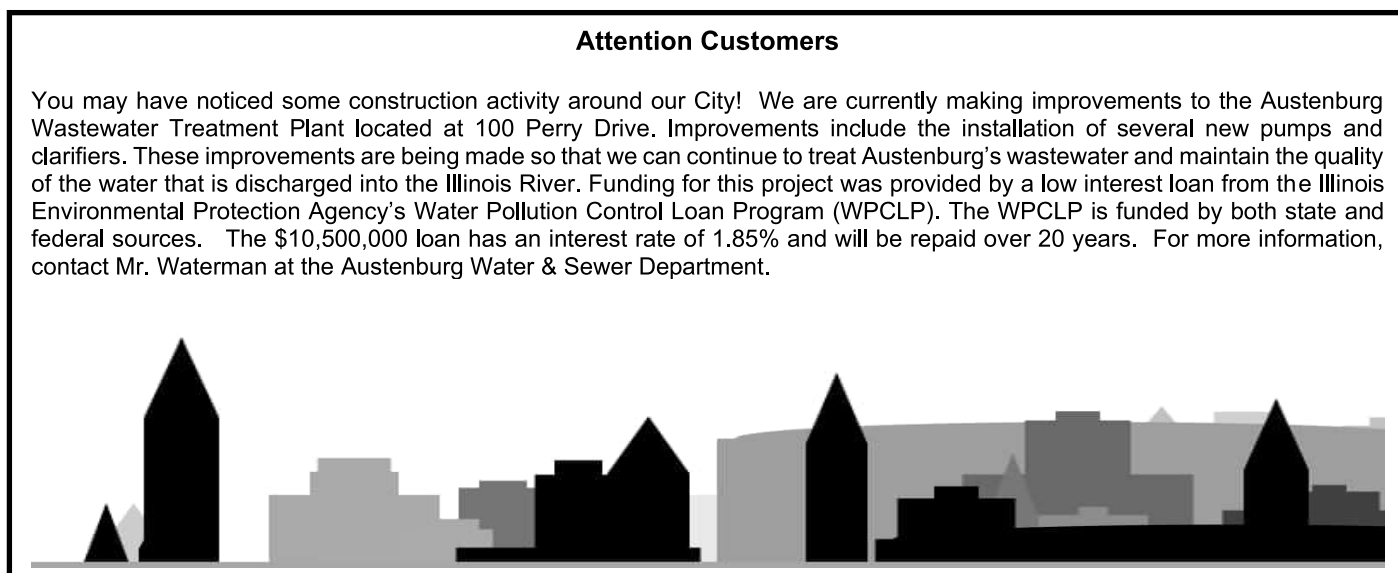
The City of Austen, Illinois recently constructed a new 500,000-gallon elevated storage tank. The new tank replaces an undersized, antiquated, 80-year old tank on Main Street. Funding for this project was provided by a low interest loan from the Illinois Environmental Protection Agency's Public Water Supply Loan Program (PWSLP). The PWSLP is funded by both state and federal sources. The \$1,500,000 loan has an interest rate of 1.90% and will be repaid over 20 years. The new tank will meet the recommended water storage standards based on our water usage. For more information contact the Austen Water Department.



Option 2: Insert in Water and/or Sewer Bill

Any utility or municipality that sends a water or sewer bill has the option to include a single page insert attached to the bill that describes the project that is being constructed. This approach would effectively publicize the project to those individuals directly benefiting from it. Communities choosing this option will need to have the following included in their insert:

- Name of facility, project, and community served;
- The loan program that is being used for the project;
- The project is being funded either wholly or partially by the Agency;
- Brief description of project; and
- Brief listing of benefits project will bring to the community.



Option 3: Online

The online approach may be the most cost-effective approach of informing residents. If the online approach is used, the information should be posted on a reliable source which is well-known by the community such as the municipality's own website. If this option is selected, the following must be posted on a website for the duration of the construction activity:

- Name of facility, project, and community served;
- The loan program that is being used for the project;
- The project is being funded either wholly or partially by the Agency;
- Brief description of project; and
- Brief listing of benefits project will bring to the community.

Below is sample language that may be used in any of the above options

Construction of **[insert brief description of upgrades/repairs]** to the **[name of facility, project location]** were financed by the **[Clean Water or Drinking Water]** State Revolving Fund (SRF). The SRF program is administered by the Illinois Environmental Protection Agency and receives a portion of its money to fund these types of projects from the U.S. Environmental Protection Agency. This project includes **[briefly describe project]**. Once complete, it will improve water quality for area residents and businesses in **[city, or watershed]** by **[details of benefits]**. SRF programs operate in each state to provide communities the resources necessary to build, maintain, and improve the infrastructure that protects one of our most valuable resources: water.

Option 4 Standard Signage

This is the recommended option for large projects that involve significant expansion or construction of a new facility. This option should only be selected if the sign is placed by a major road or project site where it will be visible to large number of residents. Communities selecting this option will need to include the following requirements on the sign:

- The name of the facility, project, and community served;
- Project cost;
- State agency and loan program that was used;
- The IEPA and USEPA logos (see attached).

Loan recipients are required to comply with the sign specifications provided by the EPA Office of Public Affairs (OPA) available at:

https://www.epa.gov/sites/default/files/2015-01/documents/epa_logo_seal_specifications_for_infrastructure_grants.pdf

Please only use these files to meet your SRF signage requirements. All other uses are not permitted. USEPA's logo may only be used on a sign.

If the USEPA logo is displayed along with logos of other participating entities, the USEPA logo must **not** be displayed in a manner that implies that USEPA itself is conducting the project. Instead, the USEPA logo must be accompanied with a statement indicating that the recipient received financial assistance for the project.

Further information about USEPA's logo specifications is available at: <https://www.epa.gov/aboutepa/using-epa-seal-and-logo>.



If you have general questions about the new requirements, please call IEPA's Infrastructure Financial Assistance Section at 217-782-2027.

USEPA STATE REVOLVING FUND GUIDELINES
CONSTRUCTION SIGN MEMO



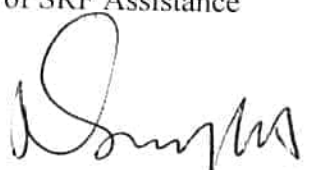
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

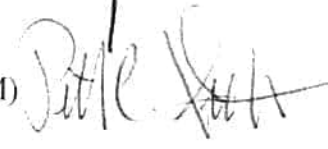
JUN - 3 2015

OFFICE OF WATER

MEMORANDUM

SUBJECT: Guidelines for Enhancing Public Awareness of SRF Assistance Agreements

FROM: Andrew D. Sawyers, Ph.D., Director
Office of Wastewater Management (4201M) 

Peter C. Grevatt, Director
Office of Ground Water and Drinking Water (4601M) 

TO: Water Management Division Directors
Regions I-X

Last year, the Environmental Protection Agency (EPA) implemented an agency-wide initiative to enhance public awareness of EPA assistance agreements nationwide. The Office of Water has developed guidelines to inform states how this initiative should be implemented in the State Revolving Fund (SRF) Programs.

The guidelines were developed with input from EPA and state SRF staff. The guidelines recognize that each of the state SRF programs and the projects they fund are different and that one implementation method will not work for everyone. Therefore, as a result of input from the states, the guidelines offer a number of options that can be used to enhance public awareness of SRF assistance agreements.

Implementation of these guidelines will begin with the awarding of the FY 2015 SRF capitalization grants. A term and condition on compliance with the guidelines is to be included in all new SRF grants.

Please have your staff provide copies of the guidelines to your states. Questions regarding the guidelines should be directed to Sheila Platt (202/564-0686) or Howard Rubin (202/564-2051).

Attachment

Enhancing Public Awareness of SRF Assistance Agreements

Introduction

The Environmental Protection Agency (EPA) is currently implementing an agency-wide initiative focused on signage to enhance public awareness of EPA assistance agreements nationwide. The intention of this effort is to communicate the positive impact and benefits of EPA funding around the country and increase awareness surrounding the improvements communities receive as a result of State Revolving Fund (SRF) assistance. Projects implemented with Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) monies are included in this initiative, as many CWSRF and DWSRF assistance agreements have direct and tangible benefits to populations around the country.

EPA's Office of Water developed these guidelines as a way to inform states of this directive and how it should be implemented in the SRF programs. The primary objective is to enhance public understanding of the positive benefits of CWSRF and DWSRF funding to towns, cities, municipalities and water systems. To that end, states are presented with a range of options for implementing these guidelines. All of these options achieve the ultimate goal of communicating to a broad audience the positive role EPA funding of the state CWSRF and DWSRF programs plays in communities across the country.

The information in the guidelines was developed with input from EPA and state staff across the country as well as the members of the State-EPA Workgroup. The guidelines recognize the wide range of project types, varied locations and different institutional approaches among states and communities. Therefore, providing states and SRF assistance recipients maximum flexibility is optimal. The guidelines allow selection of the implementation method which best balances two goals. First, it should satisfy the overall objective of communicating EPA's role in funding assistance agreements that achieve positive benefit. Second, the implementation method should be practically and financially viable for states and communities and avoid any overly burdensome investment of time and resources. In some cases, it might be appropriate for a state to select a combination of options listed below, provided this does not result in excessive cost to communities.

Project Selection Requirements

Signage requirements will not be required to apply to all SRF projects. Signage will be considered an equivalency requirement for SRF programs. States should select a set of borrowers and/or projects totaling a funding amount equivalent to the amount of their federal capitalization grant to satisfy the signage requirement. There are no other requirements or restrictions on which projects should or should not participate in this initiative. Therefore, it is at the discretion of the state SRF program to select projects most able to efficiently and effectively comply in a way that

meets the intention to enhance public awareness without significant financial hardship to the state or its borrowers. This can be done either through the selection of specific projects or borrowers, or by setting a threshold within the state for which projects will be requested to meet signage requirements. States should note that they have the option of selecting different implementation options for different borrowers depending on the location, project type and available resources. Borrowers and/or projects complying with the signage requirement must ensure limited English proficient individuals have meaningful access to activities receiving EPA funds, consistent with Executive Order 13166 and EPA Order 1000.32.

In this regard, to increase public awareness of projects serving communities where English is not the predominant language, States should encourage recipients when implementing a particular signage option to translate the language used (excluding the EPA logo or seal) into the appropriate non-English language(s). The costs of such translation are allowable, provided the costs are reasonable.

Although the signage requirement does not apply to all SRF projects, we recommend that states encourage all borrowers/projects to notify the public of the benefits of the projects and the role of the SRF, using one of the options below.

Summary of Options

The guidelines present a number of options which communities can explore to implement EPA's signage policy. The option selected should meet all of the above basic requirements while remaining cost-effective and accessible to a broad audience. The guidelines describe the following strategies as acceptable options for communities to follow:

- Standard signage
- Posters or wall signage in a public building or location
- Newspaper or periodical advertisement for project construction, groundbreaking ceremony, or operation of the new or improved facility
- Online signage placed on community website or social media outlet
- Press release

Each of these options is described in more detail in the sections below.

Implementation Option: Standard Signage

EPA recommends that large projects that involve significant expansion or construction of a new facility elect to publicize through standard signage. This option should be selected for projects where the sign would be near a major road or thoroughfare or where the facility is in a location at which this would effectively publicize the upgrades. Some facilities will not find this an appropriate or cost-effective solution. For example, investing in a large road sign for a facility that is located in a rural area or where access is limited to a smaller service road would likely not be an optimal solution.

Signs can also be located away from the project site if there is another reasonable alternative. For example, a community may elect to place a sign advertising the project near a body of water that receives discharge from a particular facility.

States selecting projects that will implement this requirement through use of a traditional sign should ensure the following are included:

- The name of the facility, project and community
- Project cost
- The State Agency/SRF administering the program
- The EPA and State Agency logos (EPA logo may only be used on a sign)

If the EPA logo is displayed along with logos of other participating entities, the EPA logo must not be displayed in a manner that implies that EPA itself is conducting the project. Instead, the EPA logo must be accompanied with a statement indicating that the recipient received financial assistance from EPA for the project. As provided in the sign specifications from the EPA Office of Public Affairs (OPA), the EPA logo is the identifier for assistance agreement projects. States are required to ensure that recipients comply with the sign specifications provided by the OPA, available at http://www.epa.gov/ogd/tc/epa_logo_seal_specifications_for_infrastructure_grants.pdf. To obtain the appropriate EPA logo graphic file, the recipient should send a request directly to OPA and include the EPA Project Officer in the communication.

Implementation Option: Posters or Brochures

Smaller projects, projects located in rural areas, and other efforts may find that it is more cost-effective and practical to advertise efforts through creation of a poster or smaller sign. If the project involves nonpoint source or green infrastructure components, those can be described at the discretion of the state or community.

The poster or brochure and acknowledgement should be visible, as well as a website or other source of information for individuals that may be curious about the SRF program. The community could also implement this option as a short pamphlet or brochure that is placed in one of these locations for community members to read.

Posters or brochures should be placed in a public location that is accessible to a wide audience of community members. This can include, but is not limited to:

- Town or City Hall
- Community Center
- Locally owned or operated park or recreational facility
- Public Library
- County/municipal government facilities
- Court house or other public meeting space

Given the low cost for producing multiple copies of the same poster, pamphlet, or brochure, communities can explore options for displaying these posters in several locations simultaneously. This would achieve the overall objective of reaching a broad audience and publicizing the project.

States have the option of creating a template verbiage and layout to provide to borrowers, particularly smaller or disadvantaged communities. This could reduce the burden on small municipalities which may or may not have the staffing capacity to meet signage requirements on their own.

States selecting projects that will implement this requirement through use of posters or brochures should ensure the following are included:

- Name of facility, project and community
- State SRF administering the program
- Project is wholly or partially funded with EPA funding
- Brief description of project
- Brief description of the water quality benefits the project will achieve

Implementation Option: Newsletter, Periodical or Press Release

For communities where there is no suitable public space or where advertisement through signage is unlikely to reach community members effectively, projects can be advertised in a community newsletter or similar periodical. States can use guidelines from their standard public notice practices. For new construction, if a groundbreaking ceremony is to be held, an announcement could publicize or accompany publicity for this event.

In some cases, it may be appropriate for the state agency to issue a formal press release announcing construction of a new facility. Distributing a single prepared statement concisely summarizing the project purpose and the joint funding from EPA and state resources can reach a wide audience as the statement goes through multiple news outlets. Programs should consider whether or not this is an option that is likely to effectively publicize the CWSRF or DWSRF program in local news sources.

If a recipient decides on a public or media event to publicize the accomplishment of significant events related to construction as a result of EPA support, EPA must be provided with at least a ten working day notice of the event and provided the opportunity to attend and participate in the event.

States selecting projects that will implement this requirement through use of a newsletter, periodical or press release should ensure the following are included:

- Name of facility, project and community
- State SRF administering the program

- Project is wholly or partially funded with EPA funding
- Brief description of the project
- Brief listing of water quality benefits to be achieved

Implementation Option: Insert or Pamphlet in Water/Sewer Bill

Utilities can consider including a single-page insert within water and sewer bills that are mailed to residents and users in the area. This approach would effectively publicize the project to those individuals directly benefitting from the project. The flyer or insert could emphasize the interest rate and financial savings that the community achieved by taking advantage of SRF funds as well as the environmental and public health benefits to the community.

States selecting projects that will implement this requirement through use of an insert or pamphlet in water/sewer bill should ensure the following are included:

- Name of facility, project and community
- State SRF administering the program
- Project is wholly or partially funded with EPA funding
- Brief description of the project
- Brief listing of water quality benefits to be achieved

Implementation Option: Online & Social Media Publicity

Many communities are increasingly finding that the online forum is the most cost-effective approach to publicizing their SRF programs and reaching a broad audience of stakeholders. Online “signage” should follow the minimum information guidelines above and may appear on the town, community or facility website if available. In some cases, communities may be active on social media sites such as Facebook or Twitter. These can be used as an opportunity for publicizing projects and information about how SRF funds are being used in the community. These online announcements/notices may be appropriate for settings where physical signage would not be visible to a wide audience. They can be a more cost-effective option than traditional signs or publicity in print media outlets. This option may be most useful where the community’s website is a well-recognized source of information for its residents.

In the case of some projects, such as nonpoint source or sponsorship projects, there might be additional opportunities for online publicity through partner agencies or organizations. This could take place either on the organization’s website or again through social media outlets.

States selecting projects that will implement this requirement through use of online & social media publicity should ensure the following are included:

- Name of facility, project and community
- State SRF administering the program
- Project was wholly or partially funded with EPA funding
- Brief description of the project

- Brief listing of water quality benefits to be achieved

Suggested Language for Alternate Options

For any of the alternate implementation options listed above, SRF programs have discretion to structure their signage as they see appropriate. The language below is offered as an option for use in posters, pamphlets, brochures, press releases, or online materials. States may consider using the following:

“Construction of upgrades and improvements to the [Name of Facility, Project Location, or WWTP] were financed by the [Clean Water/Drinking Water] State Revolving Fund. The [CWSRF/DWSRF] program is administered by [State Agency] with joint funding from the U.S. Environmental Protection Agency and [State Name]. This project will (description of project) and will provide water quality benefits [details specifying particular benefits] for community residents and businesses in and near [name of town, city, and/or water body or watershed to benefit from project.] [CWSRF/DWSRF] programs operate around the country to provide states and communities the resources necessary to maintain and improve the infrastructure that protects our valuable water resources nationwide. “

For projects in certain areas, states should consider whether or not it is appropriate to include additional details about the projects. Specific benefits, such as reduction of CSO events, lessening of nutrient pollution, reducing contaminant levels or water pumping costs, or improvements to a particular water body, may be of interest to community residents. In these cases, including them would further serve to showcase positive efforts financed by the SRF programs. Additionally, for projects with components that meet Green Project Reserve (GPR) criteria, States may elect to detail these particular improvements. For example, the state could include quantitative improvements in energy efficiency or water conservation achieved by project upgrades. If the project includes green infrastructure components such as rain gardens and green roofs that have environmental and aesthetic benefits to the community, these can be described briefly as well. Again, this additional information can be included at the discretion of the state when it is appropriate, given the project type, location, and the type of signage or publicity effort selected.

SECTION 01 52 13
FIELD OFFICES AND SHEDS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Materials, Equipment, and Furnishings.
 - 2. Construction.
 - 3. Environmental Control.
 - 4. CONTRACTOR Office and Facilities.
 - 5. ENGINEER Office.
 - 6. Storage Areas and Sheds.
 - 7. Preparation.
 - 8. Installation.
 - 9. Maintenance and Cleaning.
 - 10. Removal.

PART 2–PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

- A. Materials, equipment, and furnishings shall be serviceable, new or used, and adequate for required purpose.

2.02 CONSTRUCTION

- A. Portable or mobile buildings or buildings shall be constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. CONTRACTOR shall provide structurally sound, secure, weathertight enclosures for office and storage spaces.
- C. Temperature transmission resistance of floors, walls, and ceilings shall be compatible with occupancy and storage requirements.
- D. Exterior materials shall be weather resistant.
- E. Interior materials in offices shall consist of sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
- F. Lighting for offices shall be 50 footcandles minimum at desk top height, with exterior lighting at entrance doors.
- G. Provide appropriate type fire extinguisher at each office and each storage area.
- H. Interior materials in storage sheds shall be as required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

- A. Heating, cooling, and ventilating for offices shall consist of automatic equipment to maintain comfort conditions; 70°F heating and 78°F cooling.
- B. Heating and ventilation for storage spaces shall be as needed to maintain products in accordance with Contract Documents and to provide adequate lighting for maintenance and observation of products.

2.04 CONTRACTOR OFFICE AND FACILITIES

- A. CONTRACTOR shall provide facilities to meet CONTRACTOR's needs and to provide space for Project meetings.
- B. Provide telephone as required for CONTRACTOR's needs.
- C. Provide furnishings in meeting area. As a minimum, provide conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.

2.05 ENGINEER OFFICE

- A. At the Eastern Receiving Station site, CONTRACTOR shall provide separate trailer for sole use of ENGINEER, with separate entrance door with new lock and two keys.
- B. Minimum area shall be 200 square feet, minimum dimension 8 feet.
- C. Minimum total area of windows shall be 10% of floor area, with operable sash and insect screens. Provide operable blinds on all windows. Locate to provide views of construction area.
- D. Electrical distribution panel shall have two circuits minimum, 110-volt, 60 Hz service. Provide minimum four 110 volt duplex convenience outlets, one on each wall.
- E. Provide cellular phone with voicemail service. Include cellular service for phone until final completion.
- F. Provide the following personal computer items:
 - 1. One desktop or laptop PC, Windows compatible, with minimum, 3.0 GhZ Multi Core (latest or previous generation) Intel i5, i7, or i9 processor, 16 GB RAM (or larger), 500 GB Solid State Drive (or larger), GB Ethernet and WiFi NIC, Six USB 3.0 or higher ports, current Windows version, and CDR/DVDR Drive.
 - 2. Video Card with 1024 MB RAM capable of displaying a minimum resolution of 1920 x 1080.
 - 3. External 500 GB (or larger) USB 3.0 hard drive with software for backing up computer.
 - 4. Setup software and verify software backups and restores the computer and its data files.
 - 5. Minimum of two LCD displays, minimum 24-inch capable of displaying 1920 x 1080 or higher resolution.
 - 6. All in one color multi-function device (print, copy, fax, scan) with USB and WiFi connectivity. Must accommodate both 8.5-inch by 11-inch and 11-inch by 17-inch paper.

Replenish paper, cartridges, and other supplies before fully expended. Spare or refill cartridges shall be supplied at all times.

7. Current Microsoft Office version compatible with supplied operating system and hardware.
8. Current version of Antivirus software with subscription to new updates.
9. A broadband high speed internet service provider with minimum download speeds of 100 Mbps; minimum upload speeds of 25 Mbps, or best available in area including satellite connections.
10. K Slot or Kensington lock and cable system to deter theft.
11. Webcam suitable and certified for web-conferencing with a resolution of 1080p or better.
12. All necessary cables for system configurations.
13. PC, monitor, and printer to be set up, configured, and fully functional for use with communications and Microsoft Office Software. Security lock system installed.

G. Provide bottled drinking water dispenser and refill as necessary.

H. Provide the following furnishings:

1. One desk, minimum 54-inch by 30-inch, with three drawers.
2. One drafting table, 36-inch by 72-inch, with one equipment drawer.
3. Rack to hold working drawings, shop drawings, and record documents.
4. One standard four-drawer legal size metal filing cabinet.
5. Six linear feet of metal bookshelves.
6. One swivel armchair.
7. Two straight chairs.
8. One drafting table stool.
9. One tackboard, 36-inch by 30-inch.
10. One wastebasket.

2.06 STORAGE AREAS AND SHEDS

- A. Provide storage areas and sheds of size to meet storage requirements for products of individual sections, allowing for access and orderly provision for maintenance and for observation of products to meet requirements of Section 01 60 00–Materials and Equipment.

PART 3–EXECUTION

3.01 PREPARATION

- A. CONTRACTOR shall fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

- A. CONTRACTOR shall install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed or as agreed upon by ENGINEER.
- B. Provide two hard surfaced parking spaces for use by ENGINEER, connected to office by hard surfaced walk.

3.03 MAINTENANCE AND CLEANING

- A. CONTRACTOR shall maintain approach walks free of mud, water, and snow.

3.04 REMOVAL

- A. Upon final acceptance and completion of the Work, CONTRACTOR shall remove field offices, foundations, utility services, and debris and shall restore areas.

END OF SECTION

SECTION 01 57 00
TEMPORARY CONTROLS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Dust Control.
 - 2. Water, Erosion, and Sediment Control.
 - 3. Noise Control.
 - 4. Traffic Control.
 - 5. Site Security.
 - 6. Daily Cleanup.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DUST CONTROL

- A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.
- B. CONTRACTOR shall provide positive means to prevent airborne dust from dispersing into atmosphere.
- C. CONTRACTOR shall provide partitions, enclosures, etc., within buildings as necessary to confine dust and protect adjacent areas.

3.02 WATER, EROSION, AND SEDIMENT CONTROL

- A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. CONTRACTOR shall protect Site from puddling or running water.
- C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.
- D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

- E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.
- F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.
- G. Erosion control measures shall comply with the current edition of the Illinois Urban Manual.

3.03 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

3.04 TRAFFIC CONTROL

- A. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen, and other traffic control devices in the construction zone.
- B. Conduct operations with minimum interference to roadways.
- C. Maintain two-way traffic on streets at all times.
- D. All traffic control measures shall meet the requirements of Illinois Manual on Uniform Traffic Control Devices for Streets and Highways, Latest Edition, and the Standard Specifications for Traffic control Items, Latest Edition.
- E. Do not close or obstruct roadways without approval of OWNER.

3.05 SITE SECURITY

- A. CONTRACTOR shall have the sole responsibility of safeguarding the Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.
- B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

3.06 DAILY CLEANUP

- A. CONTRACTOR shall clean up the Site and remove all rubbish on a daily basis.

- B. CONTRACTOR shall clean up public streets and highways and remove any dirt, mud, or other materials due to project traffic on daily basis and shall comply with all local and state ordinances and permit requirements.

END OF SECTION

SECTION 01 60 00
MATERIALS AND EQUIPMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.
- B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

1.02 PRODUCTS

- A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.
- B. CONTRACTOR shall not use materials and equipment removed from existing construction, except as specifically required, or allowed, by the Contract Documents.
- C. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.
- D. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

1.03 TRANSPORTATION AND HANDLING

- A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.
- B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.
- C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.
- D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.
- E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.
- F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

1.04 DELIVERY AND RECEIVING

- A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.
- B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; work activities of other contractors or OWNER; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.
- C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.
- D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.
- E. Immediately on delivery, CONTRACTOR shall inspect shipment to review that:
 - 1. Product complies with requirements of Contract Documents and reviewed submittals.
 - 2. Quantities are correct.
 - 3. Accessories and installation hardware are correct.
 - 4. Containers and packages are intact and labels legible.
 - 5. Products are protected and undamaged.

1.05 STORAGE AND PROTECTION

- A. General:
 - 1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
 - 2. Any additional off-site space required shall be arranged by CONTRACTOR.
 - 3. CONTRACTOR shall allocate the available storage areas and coordinate their use by the trades on the job.
 - 4. CONTRACTOR shall arrange storage in a manner to provide access for maintenance of stored items and for observation.
- B. In enclosed storage, CONTRACTOR shall:
 - 1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
 - 2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
 - 3. Provide ventilation for sensitive products as required by manufacturer's instructions.
 - 4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
 - 5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
 - 6. Store liquid materials away from fire or intense heat and protect from freezing.
- C. At exterior storage, CONTRACTOR shall:
 - 1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
 - 2. Store tools or equipment that carry dirt outside.
 - 3. Store large equipment so as not to damage the Work or present a fire hazard.

4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.
5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.
6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
7. Provide surface drainage to prevent erosion and ponding of water.
8. Prevent mixing of refuse or chemically injurious materials or liquids.
9. Cover aggregates such as sand and gravel in cold wet weather.
10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

1.06 MAINTENANCE OF STORAGE

- A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.
- B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.
- C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.
- D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

1.07 INSTALLATION REQUIREMENTS

- A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.
- B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.
- C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

1.08 EQUIPMENT WARRANTIES

- A. Warranties shall be nonprorated, include all parts and labor, and be in written form. Warranties shall specifically exclude buyer's indemnification language. Warranty language shall not eliminate manufacturer's responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Manufacturer shall pay expenses incurred for repairs and parts replacement not made by manufacturer if

manufacturer's response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

1.09 CONCRETE EQUIPMENT BASE

- A. Cast-in-place concrete equipment bases shall be provided for all new and relocated equipment including electrical control panels, VFD enclosures, etc. Concrete equipment bases shall be provided by CONTRACTOR except where specifically noted to be provided by others. Bases shall be 3 1/2-inch minimum height and shall be a minimum of 3 inches larger than equipment being supported. Grouting of equipment bases shall be as recommended by equipment manufacturer.
- B. Concrete and grout shall meet applicable sections of the Specifications.
- C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 73 29

CUTTING, PATCHING, AND ALTERATIONS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: CONTRACTOR shall be responsible for all cutting, fitting, patching, and other alterations required to complete the Work as specified herein or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the Work to install improperly sequenced Work.
 - 3. Remove and replace defective Work.
 - 4. Remove and replace Work not conforming to requirements of the Contract Documents.
 - 5. Remove samples of installed Work as specified for testing.
 - 6. Provide penetrations of surfaces for installation of piping and electrical conduit.

1.02 REFERENCES

- A. ANSI A10 Safety Requirements for Construction and Demolition.

1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall perform all cutting, patching, and alterations in strict accordance with pertinent requirements of these Specifications.
- B. Except as modified by governing codes, CONTRACTOR shall comply with the applicable provision and recommendations of ANSI A10.

1.04 SUBMITTALS

- A. CONTRACTOR shall submit a written request to OWNER well in advance of executing any cutting or alteration which affects the following:
 - 1. Work of OWNER or any separate contractor.
 - 2. Structural value or integrity of any element of the Project.
 - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. Efficiency, operational life, maintenance, or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.
- B. The request shall include:
 - 1. Description of affected work.
 - 2. The necessity for cutting, patching, or alteration.
 - 3. Effect on work of OWNER, any separate contractor, or on the structural or weather-proof integrity of the Project.
 - 4. Description of proposed work to include:
 - a. Scope of cutting, patching, or alteration.
 - b. Trades who will execute the Work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.

- 5. Alternatives to cutting and patching.
 - 6. Written permission of any separate contractor whose work will be affected.
- C. Submit written notice to OWNER designating the date and the time the Work will be uncovered or executed.

1.05 SCHEDULING AND COORDINATION

- A. All work under this section shall be coordinated with OWNER's work forces and those of other contractors and shall be accomplished at times acceptable to OWNER.
- B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing building, notify ENGINEER and OWNER 72 hours in advance and obtain OWNER's approval before proceeding with this phase of the Work. Temporary facilities, if required, shall be in place prior to disruption of service.

PART 2-PRODUCTS

2.01 NEW MATERIALS

- A. For replacement of work removed, CONTRACTOR shall use materials which comply with the pertinent sections of these Specifications.

PART 3-EXECUTION

3.01 PREPARATION AND PROTECTION

- A. CONTRACTOR shall provide temporary bracing, shoring, needling, and support of the structure during alterations work as necessary to prevent collapse, settling, or deflection and to protect persons and property from injury or damage.
- B. Temporary supports must adequately carry all existing and imposed load.
- C. CONTRACTOR shall provide and maintain temporary protection of surface finishes, equipment, and adjacent work designated to remain where demolition, removal, and new work is being done, connections are being made, materials are being handled, or equipment is being removed.
- D. CONTRACTOR shall provide temporary partitions or barriers to contain all dust, dirt, and debris from entering into finished areas.
- E. CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.
- F. CONTRACTOR shall provide waterproofing, weather protection, heat, and other facilities for that portion of the Work which may be exposed by cutting and patching, demolition, or other alterations.

3.02 PERFORMANCE

- A. CONTRACTOR shall accomplish all work of cutting, removal, demolition, patching, or other alterations using only persons skilled in the appropriate trade.
- B. CONTRACTOR shall execute the Work in a careful and orderly manner with the least possible disturbance to the public and to the occupants of the building.
- C. CONTRACTOR shall execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.
- D. CONTRACTOR shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. CONTRACTOR shall fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. CONTRACTOR shall thoroughly clean and prepare all surfaces to receive new finish or covering to completely remove all dirt, dust, grease, oil, paint, loose materials, and soil.
- G. CONTRACTOR shall refinish entire surface as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish entire unit.

3.03 DEMOLITION, CUTTING, AND REMOVAL

- A. Cutting and removal of construction shall be performed by CONTRACTOR so as not to cut or remove more than is necessary and so as not to damage adjacent work.
- B. CONTRACTOR shall cut out embedded anchorages and attachment items as required to properly provide for patching and repair of the respective finishes.
- C. CONTRACTOR shall not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
- D. CONTRACTOR shall not cut operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.
- E. CONTRACTOR shall not cut work exposed to view (exterior or interior) in a manner resulting in noticeable reduction of visual qualities as determined by OWNER.
- F. Construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of careless cutting or demolition and is unsuitable for use intended shall be removed and replaced at no additional cost to OWNER.
- G. CONTRACTOR shall clean demolished areas and remove debris, waste, and rubbish from the building at the conclusion of each day's work.
- H. CONTRACTOR shall not let piled waste material endanger the structure.

3.04 PATCHING, EXTENDING, AND MATCHING

- A. Patching work shall conform to the standards of the Specifications where applicable, and where not specified, work shall conform to the highest standards of the applicable trade.
- B. CONTRACTOR shall patch construction to match adjacent work unless noted otherwise.
- C. Patching or restoration shall be carried to natural breaks (e.g., corners) wherever possible.
- D. CONTRACTOR shall provide adequate support to substrate for patching finishes.

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSEOUT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Closeout Procedures.
 - 2. Final Cleaning.
 - 3. Adjusting.
 - 4. Project Record Documents.
 - 5. Warranties.

1.02 CLOSEOUT PROCEDURES

- A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.
- B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work or designated portion thereof for substantial completion.
 - 1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
 - 2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
 - 3. Submit consent of surety (if surety required in Contract).
 - 4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.

1.03 FINAL CLEANING

- A. It is CONTRACTOR's responsibility to completely clean up the inside and outside of all buildings and the construction site at the completion of the Work.
- B. CONTRACTOR shall clean areas of the building in which painting and finishing work is to be performed just prior to the start of this work and maintain these areas in satisfactory condition for painting and finishing. This cleaning includes:
 - 1. Removal of trash and rubbish from these areas.
 - 2. Broom cleaning of floors.
 - 3. Removal of any plaster, mortar, dust, and other extraneous materials from finish surfaces, including but not limited to exposed structural steel, miscellaneous metal, masonry, concrete, mechanical equipment, piping, and electrical equipment.
- C. In addition to the cleaning specified above and the more specific cleaning that may be required in various technical sections of the Specifications, CONTRACTOR shall prepare the Project for occupancy by a thorough cleaning throughout, which shall include the following:

1. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
2. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
3. Replace filters of operating equipment.
4. Clean debris from roofs, gutters, downspouts, and drainage systems.
5. Clean site; sweep paved areas, rake clean landscaped surfaces.
6. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.04 ADJUSTING

- A. CONTRACTOR shall adjust operating products and equipment to provide smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

- A. CONTRACTOR shall maintain on Site one set of the following record documents to record actual revisions to the Work:
 1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. CONTRACTOR shall make entries that are complete and accurate, enabling future reference by OWNER.
- C. CONTRACTOR shall store record documents separate from documents used for construction.
- D. CONTRACTOR shall record information concurrent with construction progress.
- E. Specifications: CONTRACTOR shall legibly mark and record at each Product section description of actual products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by addenda and modifications.
- F. Record Drawings: CONTRACTOR shall legibly mark each item to record actual construction including:
 1. Measured depths of foundations in relation to finish floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract Drawings.

1.06 WARRANTIES

- A. CONTRACTOR shall provide warranties beyond project one-year warranty as required by technical sections.
- B. Submit warranty information as follows:
 - 1. Provide original copies bearing authorized signatures.
 - 2. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers, and provide Table of Contents and assemble in three-ring binder with durable cover.
 - 3. Submit with request for certificate of Substantial Completion.
 - 4. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance listing date of acceptance as start of warranty period.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 91 00
STARTING OF SYSTEMS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. General.
 - 2. Equipment and System Installation.
 - 3. Starting Equipment and Systems.
 - 4. Demonstration, Instructions, and Operator Training.
 - 5. Start-Up and Testing.
 - 6. Equipment Systems Requiring Certification of Proper Installation.
 - 7. Equipment Systems Requiring Additional Documentation.
- B. CONTRACTOR shall perform the Work described in the following subsections.

1.02 GENERAL

- A. The number of days for manufacturer's services stated in the Specifications shall be considered as the minimum number of days. Should additional time be required for services because of equipment malfunction or other problem, such time shall be at the expense of CONTRACTOR, with no change in Contract Price.
- B. "Days" specified shall consist of 8-hour days on-site, excluding travel time.
- C. CONTRACTOR shall designate and provide one person to be responsible for scheduling, coordinating, and expediting the specified services. Scheduling the services shall be done in cooperation with, and with the prior approval of ENGINEER and OWNER. Such schedule shall be arranged with the appropriate subcontractors, manufacturers, and suppliers with sufficient time to allow their compliance with the service requirements.
- D. CONTRACTOR shall manage equipment checkout such that checkout has been completed and deficiencies addressed prior to demonstration and training. Scheduling training prior to checkout may result in cancellation when checkout cannot be completed prior to training.

1.03 EQUIPMENT AND SYSTEM INSTALLATION

- A. Competent and experienced technical personnel shall represent the manufacturers of all equipment and systems for as many days as may be necessary to provide proper installation and to resolve assembly or installation problems at the site that are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers for all equipment furnished, whether or not specifically set forth in the Specifications.
- B. Where a Certificate of Proper Installation is called for in this Specification Section, the manufacturer's representative shall provide the attached Certificate of Proper Installation stating that the equipment or system has been installed in accordance with the manufacturer's instructions and has been inspected by a manufacturer's authorized

representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, that the proper electrical and mechanical connections have been made, and that any other manufacturer requirements have been met. This certification shall be provided to ENGINEER and OWNER prior to the start-up. This certificate is in addition to the manufacturer's standard startup reports, checklists, and other pertinent information.

- C. Functional (or run) testing is required for all equipment and systems. The manufacturer's representative shall supervise the functional test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. The Manufacturer's Certificate of Proper Installation shall state that proper adjustments have been made and that the equipment or system is ready for start-up.
- D. Manufacturer shall demonstrate, using laser alignment equipment, if appropriate, that the installed equipment has been aligned properly. Final acceptance of equipment will not be granted until manufacturer has demonstrated to ENGINEER that acceptable alignment to tolerances have been achieved. For pumps with motors 7.5 hp and larger, the acceptable shaft alignment tolerances shall be as recommended in the pump manufacturer's written instructions and shall include parallel offset and angular gap measurements.

1.04 STARTING EQUIPMENT AND SYSTEMS

- A. Where field testing and start-up services are called for in the Specifications, or when technical assistance is necessary as a result of any malfunction of the equipment or system furnished, the manufacturer's representative shall provide such services.
- B. Manufacturer's representative shall also conduct and/or assist with performance testing, as required by the Specifications. These services shall continue until such times as the applicable equipment or system has been successfully tested for performance and has been accepted by OWNER for full-time operation.
- C. Coordinate schedule for start-up of various equipment and systems. Coordination includes, but is not limited to, communication with subcontractors, suppliers, OWNER, and ENGINEER. CONTRACTOR shall confirm that all necessary work is complete and that the equipment and systems can be operated in conjunction with all associated processes.
- D. Notify ENGINEER and OWNER a minimum of 7 days prior to start-up of each item using the attached Equipment Startup and O&M Training Scheduling form. CONTRACTOR shall submit form to ENGINEER.
- E. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- F. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- G. Verify wiring and support components for equipment are complete and tested.
- H. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.

- I. Require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up and to supervise placing equipment or system in operation. Authorized representative shall provide approval for starting of systems in writing where specified.
- J. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report. In addition, CONTRACTOR shall submit a fully executed Certificate of Proper Installation form if required in Paragraph 3.01 of this section.

1.05 DEMONSTRATION, INSTRUCTIONS, AND OPERATOR TRAINING

- A. For all mechanical equipment and systems and where called for in the Specifications, provide a qualified technical representative to provide detailed instructions to OWNER's personnel for operation and maintenance of equipment and associated instrumentation. Training services shall include pre-start-up classroom instruction and start-up on-site instruction, as stated in the Specifications.
- B. Refer to the Specifications for additional training requirements.
- C. CONTRACTOR shall coordinate the pre-start-up training periods with OWNER's operating personnel and manufacturers' representatives.
 - 1. Schedule training dates and times with OWNER, that are acceptable to OWNER, using equipment, startup, and O&M training form. Normal hours available for training are between 7:30 A.M. to 4 P.M., Monday through Friday, except for holidays.
 - 2. Submit outline and presentation to ENGINEER at least 7 days in advance of training.
 - 3. Provide name, contact information, and brief synopsis of qualifications of the trainer.
 - 4. If materials above are not provided at least 7 days in advance, training may be canceled.
 - 5. Failure of supplier's or manufacturer's representative to appear for scheduled training, failure to notify OWNER 24 hours in advance of need to cancel scheduled training or failure to arrive within 30 minutes of start of scheduled training shall result in reimbursement to OWNER for time lost by OWNER's personnel in waiting for arrival of manufacturer's representative. Except in case of failure to arrive on time, time will not exceed 1 hour for each employee scheduled to receive training. Failure to arrive on time will be reimbursed by actual time late, up to 1 hour, after 1 hour, training will be rescheduled. CONTRACTOR shall reimburse OWNER via a change order.
 - 6. During the training, instructor will dedicate its time solely to training and not start-up services.
 - 7. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER's personnel in detail to explain all aspects of operation and maintenance.
 - 8. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.
 - 9. Prepare and insert additional data in operation and maintenance manuals when need for additional data becomes apparent during instruction.
 - 10. OWNER may videorecord the training for future internal use. Provide to OWNER paper and electronic copies of any media used as part of training.

11. Provide training handouts for each of OWNER's personnel present.

- D. CONTRACTOR shall provide attached Certificate of Operator Training cosigned by OWNER and supplier's representative verifying training was accomplished to satisfaction of all parties.
- E. Operation and maintenance manual submitted in accordance with Section 01 33 00—Submittals shall be provided prior to operator training.
- F. For equipment or systems requiring seasonal operation, perform demonstration for dormant season at start of dormant season.
- G. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.
- H. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

1.06 START-UP AND TESTING

- A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER, and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.
- B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical power and control equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices, or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.
- C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

PART 2—PRODUCTS

NOT APPLICABLE

PART 3—EXECUTION

3.01 EQUIPMENT SYSTEMS REQUIRING CERTIFICATION OF PROPER INSTALLATION

- A. All space and process related heating, cooling, and ventilation equipment and systems specified in Division 23.

- B. Section 26 32 13.1–East Receiving Station Standby Power System.
- C. Section 26 32 13.2–West Receiving Station Standby Power System.
- D. Section 26 36 24.1–East Receiving Station Service Entrance-Rated Automatic Transfer Switches.
- E. Section 26 36 24.2–West Receiving Station Service Entrance-Rated Automatic Transfer Switches.
- F. All equipment specified in Divisions 43 and 46.

3.02 EQUIPMENT SYSTEMS REQUIRING ADDITIONAL DOCUMENTATION

- A. Section 26 09 00–Controls and Instrumentation: Documented date(s) of CONTRACTOR written request for Factory Acceptance Test.
- B. Section 26 09 00–Controls and Instrumentation: Documented date(s) of CONTRACTOR written request for On-Site Acceptance Test.

END OF SECTION

TS No. _____

EQUIPMENT START-UP AND O&M TRAINING SCHEDULING FORM
STRAND ASSOCIATES, INC.®

PROJECT _____ CLIENT _____

CONTRACT _____

CONTRACTOR _____ Date: _____

The following equipment is scheduled for start-up on _____

EQUIPMENT NAME: _____ SPECIFICATION SECTION: _____

MANUFACTURER: _____ MINIMUM HOURS OF TRAINING: _____

DATE O&M MANUALS SUBMITTED: _____

Specification Section 01 91 00 requires that start-up and operation and training be conducted by a qualified manufacturer's representative prior to placing equipment in operation. Review Specification Sections 01 33 00 and 01 45 00 and the individual equipment sections for start-up and training requirements. OWNER may find it necessary to propose alternate dates for training based on conflicts with other training and staff availability. The Operation and Maintenance Manuals must be submitted prior to training.

After the equipment or system has been properly installed and is functioning correctly, submit a written report in accordance with Specification Section 01 45 00.

Submit the completed form to ENGINEER and OWNER at least 7 days prior to start-up and training.

Proposed Training Date: _____ Time of Training: _____

Factory-trained representative giving training:

Name(s): _____

Company: _____

Address: _____

Phone: _____

Fax: _____

E-mail: _____

CERTIFICATE OF PROPER INSTALLATION

Project_____

Equipment_____

Specification Section_____

Contract_____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature_____Date_____

Name (print)_____

Title_____

Representing_____

CONTRACTOR

Signature_____Date_____

Name (print)_____

Title_____

This form shall be completed and submitted to ENGINEER prior to OWNER training.

CERTIFICATE OF OPERATOR TRAINING

Project_____

Equipment_____

Specification Section_____

Contract_____

I hereby certify the equipment supplier/manufacture has instructed OWNER's personnel in the start-up operation and maintenance of this equipment as required in the Specifications.

MANUFACTURER'S REPRESENTATIVE

Signature_____Date_____

Name (print)_____

Title_____

Representing_____

CONTRACTOR

Signature_____Date_____

Name (print)_____

Title_____

OWNER

I hereby state that my operating personnel received instruction for start-up, operation, and maintenance of this equipment.

Signature_____Date_____

Name (print)_____

Title_____

END SECTION

Section 01 91 00-8

3894.061/2-2025

WAGE RATES

Will County Prevailing Wage Rates posted on 1/15/2026

Overtime																				
Trade Title	Rg	Type	C	Base	Foreman	M-F	Sa	Su	Hol	H/W	Pension	Vac	Trng	Other Ins	Add OT 1.5x owed	Add OT 2.0x owed				
ASBESTOS ABT-GEN	All	ALL		51.40	52.40	1.5	1.5	2.0	2.0	18.32	17.71	0.00	0.91	0.00	0.00	0.00				
ASBESTOS ABT-MEC	All	BLD		42.02	45.38	1.5	1.5	2.0	2.0	16.44	16.64	0.00	0.92		3.37	6.73				
BOILERMAKER	All	BLD		58.91	64.21	2.0	2.0	2.0	2.0	7.07	27.02	0.00	3.69	2.31	0.00	39.30				
BRICK MASON	All	BLD		53.06	58.37	1.5	1.5	2.0	2.0	12.95	26.26	0.00	1.57	0.00	4.23	8.45				
CARPENTER	All	ALL		56.71	62.38	2.0	2.0	2.0	2.0	13.64	30.98	1.77	1.04		0.00	0.00				
CEMENT MASON	All	ALL		48.85	50.85	2.0	1.5	2.0	2.0	13.37	33.80	0.00	0.80	0.00	0.00	0.00				
CERAMIC TILE FINISHER	All	BLD		49.09	49.09	1.5	1.5	2.0	2.0	13.25	17.61	0.00	1.37	0.00	5.57	11.14				
CERAMIC TILE LAYER	All	BLD		57.04	62.04	1.5	1.5	2.0	2.0	13.25	21.60	0.00	1.50	0.00	7.63	15.26				
COMMUNICATION TECHNICIAN	All	BLD		46.00	50.60	1.5	1.5	2.0	2.0	17.54	18.15	0.00	0.75	2.37	0.00	0.00				
CONCRETE SPECIALIST	All	BLD		51.81	58.21	1.5	1.5	2.0	2.0	12.95	27.56	0.00	1.57	0.00	4.88	9.75				
CONCRETE SPECIALIST WELDER	All	BLD		54.40	58.21	1.5	1.5	2.0	2.0	12.95	27.56	0.00	1.57	0.00	4.88	9.75				
ELECTRIC PWR EQMT OP	All	ALL		64.58	70.87	1.5	1.5	2.0	2.0	12.99	22.45	0.00	3.66	0.00	0.00	0.00				
ELECTRIC PWR GRNDMAN	All	ALL		50.37	70.87	1.5	1.5	2.0	2.0	10.13	17.51	0.00	2.85	0.00	0.00	0.00				
ELECTRIC PWR LINEMAN	All	ALL		64.58	70.87	1.5	1.5	2.0	2.0	12.99	22.45	0.00	3.66	0.00	0.00	0.00				
ELECTRICIAN	All	BLD		56.00	61.04	1.5	1.5	2.0	2.0	18.13	22.93	0.00	1.35	5.40	0.00	0.00				
ELEVATOR CONSTRUCTOR	All	BLD		70.68	79.52	2.0	2.0	2.0	2.0	16.28	21.36	5.65	0.80		0.00	0.00				
GLAZIER	All	BLD		53.55	55.05	1.5	2.0	2.0	2.0	16.04	26.64	0.00	2.30	0.00	0.00	0.00				
HEAT/FROST INSULATOR	All	BLD		56.02	59.38	1.5	1.5	2.0	2.0	16.44	19.88	0.00	0.92		4.99	9.97				
IRON WORKER	All	ALL		52.00	57.20	2.0	2.0	2.0	2.0	14.61	30.95	0.00	1.10		0.00	0.00				
LABORER	All	ALL		51.40	52.15	1.5	1.5	2.0	2.0	18.32	17.71	0.00	0.91	0.00	0.00	0.00				
LATHER	All	ALL		56.71	62.38	2.0	2.0	2.0	2.0	13.64	30.98	1.77	1.04		0.00	0.00				
MACHINIST	All	BLD		60.39	64.39	1.5	1.5	2.0	2.0	11.43	9.95	1.85	1.47	0.00	0.00	0.00				
MARBLE FINISHER	All	ALL		40.21	54.60	1.5	1.5	2.0	2.0	12.95	23.81	0.00	0.98	0.00	3.00	6.00				
MARBLE SETTER	All	BLD		52.00	57.20	1.5	1.5	2.0	2.0	12.95	25.57	0.00	1.25	0.00	3.88	7.76				
MATERIAL TESTER I	All	ALL		41.40		1.5	1.5	2.0	2.0	18.32	17.71	0.00	0.91	0.00	0.00	0.00				
MATERIALS TESTER II	All	ALL		46.40		1.5	1.5	2.0	2.0	18.32	17.71	0.00	0.91	0.00	0.00	0.00				

Will County Prevailing Wage Rates posted on 1/15/2026

MILLWRIGHT	All	ALL		56.71	62.38	2.0	2.0	2.0	2.0	2.0	13.64	30.98	1.77	1.04		0.00	0.00
OPERATING ENGINEER	All	BLD	1	64.80	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	BLD	2	63.50	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75	0.00	0.00	0.00
OPERATING ENGINEER	All	BLD	3	60.95	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	BLD	4	59.20	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	BLD	5	68.55	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	BLD	6	65.80	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	BLD	7	67.80	68.80	2.0	2.0	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	1	73.95	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	2	72.45	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	3	67.95	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	4	63.45	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	5	75.45	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	FLT	6	63.45	73.95	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	1	63.00	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	2	62.45	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	3	60.40	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	4	59.00	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	5	57.80	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	6	66.00	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
OPERATING ENGINEER	All	HWY	7	64.00	67.00	1.5	1.5	2.0	2.0	2.0	24.70	21.55	2.00	2.75		0.00	0.00
PAINTER	All	ALL		54.30	61.09	1.5	1.5	1.5	2.0		16.26	17.59	0.00	1.86	0.00	0.00	0.00
PAINTER - SIGNS	All	BLD		48.16	54.11	1.5	1.5	2.0	2.0		8.20	16.81	0.00	0.00	0.00	0.00	0.00
PILEDRIIVER	All	ALL		56.71	62.38	2.0	2.0	2.0	2.0		13.64	30.98	1.77	1.04		0.00	0.00
PIPEFITTER	All	BLD		58.50	61.50	1.5	1.5	2.0	2.0		15.15	22.85	0.00	3.12	0.00	0.00	0.00
PLASTERER	All	BLD		51.10	54.17	1.5	1.5	2.0	2.0		18.43	22.10	0.00	1.25	0.00	0.00	0.00
PLUMBER	All	BLD		60.50	64.15	1.5	1.5	2.0	2.0		19.10	17.94	0.00	1.98		0.00	0.00
ROOFER	All	BLD		52.00	57.00	1.5	1.5	2.0	2.0		12.80	18.19	0.00	1.14	0.00	0.00	0.00
SHEETMETAL WORKER	All	BLD		58.83	63.54	1.5	1.5	2.0	2.0		17.16	19.90	0.00	1.79	2.62	0.00	0.00
SPRINKLER FITTER	All	BLD		63.20	65.95	1.5	1.5	2.0	2.0		15.45	19.95	0.00	1.15	0.00	0.00	0.00

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STONE MASON	All	BLD		53.06	58.37	1.5	1.5	2.0	2.0	12.95	26.26	0.00	1.57	0.00	4.23	8.45
SURVEY WORKER	All	BLD		58.45	59.45	1.5	1.5	2.0	2.0	19.10	14.40	0.00	1.59		0.00	0.00
SURVEY WORKER	All	HWY		58.45	59.45	1.5	1.5	2.0	2.0	19.10	14.40	0.00	1.59		0.00	0.00
TERRAZZO FINISHER	All	BLD		51.44	51.44	1.5	1.5	2.0	2.0	13.25	18.87	0.00	1.41	0.00	4.45	8.89
TERRAZZO MECHANIC	All	BLD		55.35	58.85	1.5	1.5	2.0	2.0	13.25	20.26	0.00	1.46	0.00	4.70	9.39
TRAFFIC SAFETY WORKER I	All	HWY		43.40	45.40	1.5	1.5	2.0	2.0	10.08	10.08	0.00	1.05	0.00	0.00	0.00
TRAFFIC SAFETY WORKER II	All	HWY		44.40	46.40	1.5	1.5	2.0	2.0	10.08	10.08	0.00	1.05	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	1	47.95	48.50	1.5	1.5	2.0	2.0	12.15	14.31	0.00	0.35	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	2	48.10	48.50	1.5	1.5	2.0	2.0	12.15	14.31	0.00	0.35		0.00	0.00
TRUCK DRIVER	All	ALL	3	48.30	48.50	1.5	1.5	2.0	2.0	12.15	14.31	0.00	0.35	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	4	48.50	48.50	1.5	1.5	2.0	2.0	12.15	14.31	0.00	0.35	0.00	0.00	0.00
TUCK POINTER	All	BLD		52.53	53.53	1.5	1.5	2.0	2.0	11.05	23.16	0.00	1.46	0.00	0.00	0.00

Legend

Rg Region

Type Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers

C Class

Base Base Wage Rate

OT M-F Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.

OT Sa Overtime pay required for every hour worked on Saturdays

OT Su Overtime pay required for every hour worked on Sundays

OT Hol Overtime pay required for every hour worked on Holidays

H/W Health/Welfare benefit

Vac Vacation

Trng Training

Other Ins Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations WILL COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

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EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS TECHNICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice, sound and vision production and reproduction, telephone and telephone interconnect, facsimile, equipment and appliances used for domestic, commercial, educational and entertainment purposes, pulling of wire through conduit but not the installation of conduit.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of

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interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under; Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

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OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines; ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types; Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blasters; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small

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Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

SURVEY WORKER

Operates survey equipment (such as levels, transits, data collectors, GPS and robotic total stations) for the purpose of performing construction layout and/or grade checking.

SURVEY FOREMAN

Operates survey equipment (such as levels, transits, data collectors, GPS and robotic total stations) for the purpose of performing construction layout and/or grade checking; oversees survey crew operations; and/or coordinates work of survey crews.

TRAFFIC SAFETY Worker I

Traffic Safety Worker I - work associated with the delivery, installation, pick-up and servicing of safety devices during periods of roadway construction, including such work as set-up and maintenance of barricades, barrier wall reflectors, drums, cones, delineators, signs, crash attenuators, glare screen and other such items, and the layout and application or removal of conflicting and/or temporary roadway markings utilized to control traffic in construction zones, as well as flagging for these operations.

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TRAFFIC SAFETY WORKER II

Work associated with the installation and removal of permanent pavement markings and/or pavement markers including both installations performed by hand and installations performed by truck.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turntrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turntrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

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Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

FEDERAL WAGE RATES

"General Decision Number: IL20260008 01/09/2026

Superseded General Decision Number: IL20250008

State: Illinois

Construction Types: Building and Residential

Counties: Du Page, Grundy, Kane, Kendall, Lake, McHenry and Will Counties in Illinois.

BUILDING AND RESIDENTIAL PROJECTS (does not include landscape projects).

Modification Number Publication Date

0 01/02/2026

1 01/09/2026

ASBE0017-005 06/01/2024

Rates Fringes

ASBESTOS WORKER/INSULATOR

includes the application
of all insulating
materials, protective
coverings, coatings, and
finishes to all types of
mechanical systems.....\$ 55.02 35.75

Fire Stop Technician.....\$ 44.02 32.76 HAZARDOUS MATERIAL HANDLER

includes preparation,
wetting, stripping,
removal, scrapping
vacuuming, bagging and
disposing of all
insulation materials from mechanical systems,
whether they contain
asbestos or not.....\$ 41.27 32.76

----- BOIL0001-
003 05/01/2024

DU PAGE, GRUNDY, KANE, KENDALL, LAKE, MCHENRY, AND WILL COUNTIES

Rates Fringes

BOILERMAKER.....\$ 53.10 9.5%+33.50

----- BRIL0014-
001 06/01/2021

DU PAGE, GRUNDY, LAKE, and WILL COUNTIES

Rates Fringes

BRICKLAYER.....\$ 48.56 34.05	
-----	BRIL0021-
002 06/01/2021	
Rates Fringes	
MARBLE SETTER.....\$ 47.71 33.20	
-----	BRIL0021-
008 06/01/2021	
Rates Fringes	
TERRAZZO WORKER/SETTER.....\$ 48.38 30.79	
TILE FINISHER.....\$ 42.80 26.97	
TILE SETTER.....\$ 49.75 30.79	
-----	BRIL0021-
010 06/01/2017	
Rates Fringes	
MARBLE FINISHER.....\$ 33.95 26.03	
-----	BRIL0027-
002 06/01/2016	
KANE, KENDALL, and MCHENRY COUNTIES	
Rates Fringes	
BRICKLAYER.....\$ 44.88 26.62	
-----	CARP0555-
003 06/01/2022	
DUPAGE ANE LAKE COUNTIES	
Rates Fringes	
CARPENTER	
Building.....\$ 52.01 38.85	
Heavy & Highway.....\$ 52.01 38.85	
-----	CARP0555-
004 10/01/2023	
Residential	
DU PAGE and LAKE COUNTIES	
Rates Fringes	
CARPENTER.....\$ 45.61 35.31	
-----	CARP0555-
006 06/01/2022	
WILL COUNTY	
BUILDING	

Rates Fringes

Carpenter; Millwright;
Piledrivermen.....\$ 52.01 41.41
----- CARP0555-
007 10/01/2023

WILL COUNTY

RESIDENTIAL

Rates Fringes

CARPENTER.....\$ 45.61 35.31
----- CARP0555-
009 06/01/2022

KANE, KENDALL, AND McHENRY COUNTIES

BUILDING

Rates Fringes

CARPENTER
Carpenter, Floor Layer,
Lather, Millwright, and
Piledriver.....\$ 52.01 38.86
----- CARP0555-
010 10/01/2023

KANE, KENDALL, and McHENRY COUNTIES

RESIDENTIAL

Rates Fringes

CARPENTER.....\$ 45.61 35.31
----- CARP0555-
012 10/01/2023

GRUNDY COUNTY

Rates Fringes

CARPENTER
Carpenter, Millwright,
Piledriver, and Soft Floor
Layer
Building.....\$ 52.01 38.86 Residential.....\$ 45.61
35.31 -----
ELEC0009-002 05/26/2024

WILL COUNTY

Rates Fringes

Line Construction

Groundman.....\$ 48.44 60.05% Lineman and Equipment
Operator.....\$ 62.10 60.05%

----- ELEC0117-
002 06/02/2025

KANE (Northern Half) and MCHENRY COUNTIES

Rates Fringes

ELECTRICIAN

Building.....\$ 59.11 42.23

----- ELEC0117-
003 11/03/2025

KANE (Northern Half), and MCHENRY COUNTIES

Rates Fringes

ELECTRICIAN

ELECTRICAL TECHNICIAN.....\$ 48.71 35.87

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

----- ELEC0117-
004 11/04/2024

KANE (Northern Half) and MCHENRY COUNTIES

Rates Fringes

ELECTRICIAN

Residential.....\$ 44.40 34.59

----- ELEC0150-
002 06/02/2025

LAKE COUNTY

Rates Fringes

ELECTRICIAN

Building.....\$ 51.87 69.79%+15.57

Residential.....\$ 44.79 82.84%

----- ELEC0150-
DB-4

003 12/01/2025

LAKE COUNTY

Rates Fringes

ELECTRICIAN

ELECTRICAL TECHNICIAN.....\$ 48.00 39.85

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

----- ELECC0176-
003 06/01/2023

Grundy and Will Counties

Rates Fringes

ELECTRICIAN

Residential.....\$ 46.87 33.38

----- ELECC0176-
008 06/01/2023

GRUNDY and WILL COUNTIES

Rates Fringes

ELECTRICIAN

Building.....\$ 52.00 45.01

----- ELECC0176-
015 06/01/2024

GRUNDY and WILL COUNTIES

Rates Fringes

ELECTRICIAN

ELECTRICAL TECHNICIAN.....\$ 44.00 37.91

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not

the installation of raceways.

----- ELEC0461-
002 06/02/2025

KANE (Southern Half) AND KENDALL COUNTIES

Rates Fringes

ELECTRICIAN

Building.....\$ 60.17 43.50 Residential.....\$
48.98 32.73 -----

ELEC0461-005 11/03/2025

KANE (Southern Half), AND KENDALL COUNTIES

Rates Fringes

ELECTRICIAN

ELECTRICAL TECHNICIAN.....\$ 49.70 38.45

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

----- ELEC0701-
002 11/04/2019

DUPAGE COUNTY

Rates Fringes

ELECTRICIAN Building.....\$ 41.00 105.86%
Residential.....\$ 39.60 81.43%

----- ELEC0701-
003 09/01/2025

DU PAGE COUNTY

Rates Fringes

ELECTRICIAN

ELECTRICAL TECHNICIAN.....\$ 40.90 108.35%

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable,

and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

----- ELEV0002-
002 01/01/2025

DU PAGE, KANE, KENDALL, LAKE, & WILL COUNTIES

Rates Fringes

ELEVATOR MECHANIC.....\$ 70.68 38.435+a+b

FOOTNOTES:

a) PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving Day; Veterans' Day and Christmas Day.

b) Employer contributes 8% of regular hourly rate as vacation pay credit for employee with more than 5 years of service, and 6% for employee with less than 5 years service

----- ELEV0015-
002 01/01/2025

McHENRY COUNTY

Rates Fringes

ELEVATOR MECHANIC.....\$ 61.96 38.435+a+b

FOOTNOTES:

a. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

b. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Veterans' Day and Christmas Day.

----- ELEV0055-
001 01/01/2025

GRUNDY COUNTY

Rates Fringes

ELEVATOR MECHANIC.....\$ 57.99 38.435+a+b

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

B. Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving; Veterans' Day & Christmas Day

----- * ENGI0150-026 06/01/2025

BUILDING and RESIDENTIAL

Rates Fringes

OPERATOR: Power Equipment

GROUP 1.....	\$ 64.80	51.00	
GROUP 2.....	\$ 63.50	51.00	GROUP 3.....\$ 60.95
51.00			
GROUP 4.....	\$ 59.20	51.00	

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Mechanic; Asphalt Plant*; Asphalt Spreader; Autograde*; Backhoes with Caisson attachment*; Batch Plant*; Benoto(Requires two Engineers); Boiler and Throttle Valve; Caisson Rigs*; Central Redi-Mix Plant*; Combination Backhoe Front Endloader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted)*; Concrete Conveyor; Concrete Conveyor, Truck Mounted; Concrete Paver over 27E

cu. ft.*; Concrete Paver 27E cu ft and Under*; Concrete Placer*; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes*; Cranes, Hammerhead*; Cranes, (GCI and similar type Requires two operators only); Creter Crane; Crusher, Stone, etc; Derricks; Derricks, Traveling*; Formless Curb and Gutter Machine*; Grader, Elevating; Grouting Machines; Highlift Shovels or Front Endloader 2 1/4 yd. and over; Hoists, Elevators, Outside

Type Rack and pinion and similar Machines; Hoists, One, Two, and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes*; Hydraulic Boom Trucks; Hydraulic Vac (and similar equipment); Locomotives; Motor Patrol*; Pile Drivers amd Skid Rig*; Post Hole Digger; Pre- Stress

Machine; Pump Cretes Dual Ram(Requiring frequent Lubrication and Water); Pump Cretes; Squeeze Cretes-Screw Type Pumps Gypsum Bulker and Pump; Raised and Blind Hole Drill*; Roto Mill Grinder (36" and Over)*; Roto Mill

Grinder (Less Than 36")*; Scoops-Tractor Drawn; Slip-Form Paver*; Straddle Buggies; Tournapull; Tractor with Boom, and Side Boom; and Trenching Machines*.

GROUP 2: Bobcat (over 3/4 cu yd); Boilers; Brick Forklift; Broom, Power Propelled; Bulldozers; Concrete Mixer (Two Bag and over); Conveyor, Portable; Forklift Trucks; Greaser Engineer; Highlift Shovels or Front End loaders under 2 1/4 cu yd; Aotomatic Hoists, Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed;

Rock Drill (Self-Propelled); Rock Drill (Truck Mounted)*; Rollers; Steam Generators; Tractors; Tractor Drawn Vibratory Roller (Receives an additional \$.50 per hour); Winch Trucks with "A" Frame.

GROUP 3: Air Compressor-Small 250 and Under (1 to 5 not to exceed a total of 300 ft); Air Compressor-Large over 250; Combination-Small Equipment Operator; Generator- Small 50 kw and under; Generator-Large over 50 kw; Heaters, Mechanical; Hoists, Inside Elevators (Remodeling or Renovatin work); Hydrualic Power Units (Pile Driving, Extracting, and Drilling); Low Boys; Pumps Over 3" (1 To 3 not to exceed a total of 300 ft); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches; Bobcat (up to and including 3/4 cu yd)

GROUP 4 - Bobcats and/or other Skid Steer Loaders; Brick Forklifts; Oilers *-Requires Oiler

----- IRON0001-014 06/01/2025

DU PAGE (Eastern 1/4), LAKE, AND MCHENRY (Hebron, Woodstock, and East thereof) COUNTIES

Rates Fringes

IRONWORKER

Sheeter.....\$ 62.71 46.58 Structural and Reinforcing..\$ 62.46 46.58 -----
IRON0063-003 06/01/2025

LAKE, DUPAGE (Eastern 1/4) and MCHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

Rates Fringes

IRONWORKER, ORNAMENTAL.....\$ 59.26 44.81
----- IRON0063-004 06/01/2025

LAKE, DUPAGE (Eastern 1/4), and MCHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

Rates Fringes

IRONWORKER

Fence Erector.....\$ 52.25 34.31
----- IRON0136-002 07/01/2025

LAKE, DUPAGE (Eastern 1/4) and MCHENRY (HEBRON, WOODSTOCK & East thereof)

COUNTIES

Rates Fringes

IRONWORKER

Machinery Movers; Riggers;
Machinery Erectors.....\$ 54.25 47.38 Master Riggers.....\$
56.75 47.38 -----
IRON0393-002 06/01/2021

DUPAGE (REMAINDER), KANE, KENDALL (NORTHERN PART), and MCHENRY (SOUTHEAST
1/4) COUNTIES

Rates Fringes

IRONWORKER.....\$ 48.83 39.84
----- IRON0444-
002 06/01/2022

DUPAGE (ARGONNE & VIC), GRUNDY, KENDALL (Southern Part), and WILL COUNTIES

Rates Fringes

IRONWORKER.....\$ 47.80 42.50
----- IRON0498-
006 06/01/2021

MCHENRY COUNTY (Northwest Part)

Rates Fringes

IRONWORKER.....\$ 41.37 44.41
----- LAB00002-
003 06/01/2025

DU PAGE COUNTY

Rates Fringes

LABORER

GROUP 1.....\$ 51.40 36.94
GROUP 2.....\$ 51.40 36.94
GROUP 3.....\$ 51.48 36.94
GROUP 4.....\$ 51.50 36.94
GROUP 5.....\$ 51.55 36.94
GROUP 6.....\$ 51.60 36.94
GROUP 7.....\$ 51.63 36.94
GROUP 8.....\$ 51.73 36.94
GROUP 9.....\$ 51.75 36.94
GROUP 10.....\$ 51.85 36.94 GROUP 11.....\$
51.68 36.94

GROUP 12.....\$ 52.40 36.94

LABORER CLASSIFICATIONS

GROUP 1: Building laborers, Plasterer tenders, Pumps for Dewatering & other
Unclassified Laborers

GROUP 2: Fireproofing and fire shop laborers

GROUP 3: Cement gun laborers and hose

GROUP 4: Chimney over 40 feet; Scaffold laborers; Weldman-wreckers Burners

GROUP 5: Cement gun nozzle (gunite) laborers; Windlass and capstan person

GROUP 6: Stone derrickmen and handlers

GROUP 7: Jackhammermen, Power driven concrete saws and other power
equipment

GROUP 8: Firebrick & boiler laborers

GROUP 9: Chimney on fire brick; Caisson Diggers; Well Point system men

GROUP 10: Boiler setter plastic laborers

GROUP 11: Jackhammermen on fire brick work only

GROUP 12: Dosimeter (any device) monitoring nuclear exposure); Asbestos
abatement laborers; Toxic and Hazardous waste removal laborers

----- LAB00075-
001 06/01/2022

GRUNDY AND WILL COUNTIES

Rates Fringes

LABORER

GROUP 1.....	\$ 47.40	33.16
GROUP 2.....	\$ 47.40	33.16
GROUP 3.....	\$ 47.48	33.16
GROUP 4.....	\$ 47.60	33.16
GROUP 5.....	\$ 47.60	33.16
GROUP 6.....	\$ 47.75	33.16
GROUP 7.....	\$ 47.60	33.16

LABORER CLASSIFICATIONS

GROUP 1 - Mortar mixers, handling asphalt shingles; Scaffolds; Sewer and
trench work (ground level down to 8 feet); Catch basin and manhole diggers,
mesh handling on

road work; Cement and mineral filler handler; Concrete puddlers; Batch
dumpers (cement & asphalt); Vibrator operators; Sand and stone wheelers to
mixer Handlers); Concrete wheelers; Airtamping hammermen; Concrete & paving

breakers; Rock drillers/Jackhammermen; Chipping hammermen 1-Bag mixer; Asphalt laborer; Chain and power saws; Pit men; Fencing laborers; Mason tenders (mortar and brick wheeler); Kettlemen & tarmen, tank cleaners; Scaffold and staging laborers; Pot Firemen (tarmen); Heaters tender for any purpose; Water pumps (portable water pumps shall be tended by laborers if the employer determines tending is required); Rip rap; Handling of slab steel road forms in any manner, except road form setting, setting center strips, Contraction and expansion joints (road work); Unloading and handling of lumber, brick, transite materials, cast iron water pipe, reinforced concrete rods, sewer and drain tile, railroad tiles and all other creosoted materials; paving blocks and concrete forms; Handling of insulation of any type; all work involving the unloading of materials, fixtures, or furnishing, whether crated or uncrated; all mortar and composition mixers of sewer work; track laborers; Chimney and silo laborers working at a height of 1 to 48 feet; All laborers working on swinging suspended, or any type or make of scaffolding 1 to 48 feet; All laborers working inside a sphere or any type or make of tank; Working inside a sphere or any type or make of tank from bottom to a height of 48 feet; Form strippers (any type); Mechanical or motorized buggies, for concrete or masons employers; Use of skid steer loads or any other machinery which replaces the wheelbarrow or buggy; Handling multiple concrete duct or any other type of pipe used in public utility work unless otherwise specified herein; Snapping of wall ties and removal of rods; drilling of anchor bolt holes; Concrete or asphalt clipper type saws and self-propelled saws; Shoulder and grade laborers; All hydraulic electric and air or any other type of tools; Grouting and caulking; Cleaning lumber, Nail pulling, Deck hand; Dredgehand; Shore laborer; Bankmen on Floating Plant; Tool and material checkers; Signalmen and Flagmen on all construction work; Cleaning of debris; Removal of trees; Concrete curing, temporary concrete protection regardless of manner or materials used; Laborers on Apsco; Janitorial; Wrecking and demolition laborers

GROUP 2 - Sewer and drain pipe layers and multiple concrete duct or any other type of pipe used, on public utility work (ground level to 8 feet); Pumpcrete pipe handlers

GROUP 3 - Asphalt rakers; Hod carriers; Plasterer laborers; Gunnite laborers, Slab for setters on roads, highways, streets, airport runaways, and radii (any type of form) stringline men for all aforementioned work; Wagon and tower drillers on land and floating plant used on dredging; Asphalt gunners and plug men (undercoating on road work); Mortar pump laborers; Plaster pump laborers

GROUP 4 - Tunnel miners, and all laborers inside tunnel; Air blow pipemen; Torchmen (burners); Mortaring men on sewer and drain pipe (the applying of mortar and composition mixes); All bottom men on sewer work-all sewer and drain pipelayers-multiple concrete duct or any other type of pipe used on public utility work-8 feet or more below ground level, and all other sewer and trench laborers 8 feet or more below ground level regardless of excavation area; All labor work

inside cofferdam; Use of a 10 foot or more drill steel for hand held drills; Caisson laborers ground level down 15 feet; All air tools 8 feet or more below ground level; All laborers working on swinging-suspended or any type or make of scaffolds, 48 feet to 100 feet; All chimney and silo laborers working at a height of 48 to 100 feet;

All tamping hammers over 150 lbs.; All laborers working inside of a sphere or any type or make of tank at a height of 48 feet to 100 feet; all hydraulic, electric and air tools or any other type 8 feet or more below ground level; Vibrators-any type-8 feet or more below ground level

GROUP 5 - Gunnite nozzle men; Caisson laborers and all tamping hammers from 150 lbs and over; from 15 feet below ground level down to 50 feet; and all laborers working inside of a sphere or any type of tank for every additional 50 feet or part thereof above 100 feet in height

GROUP 6 - All underground cavern laborers; Caisson laborers 50 feet or more below ground level; Laborers working under radio active conditions (suits up); Blasting men (Powdermen)

GROUP 7 - Dosimeter (any device) used for monitoring nuclear exposure; Asbestos abatement worker; Toxic and hazardous waste removal laborer; and chimney and silo laborers for every additional 50 feet or any part thereof above 100 feet high

----- LAB00149-
001 06/01/2025

KANE, KENDALL, AND MCHENRY COUNTIES

Rates Fringes

LABORER

GROUP 1.....	\$ 51.40	36.94	GROUP 2.....	\$
51.65	36.94			
GROUP 3.....	\$ 51.40	36.94		
GROUP 4.....	\$ 51.65	36.94		
GROUP 5.....	\$ 51.65	36.94		
GROUP 6.....	\$ 52.10	36.94		
GROUP 7.....	\$ 52.10	36.94		
GROUP 8.....	\$ 51.80	36.94		

LABORER CLASSIFICATIONS

GROUP 1 Common Laborer

GROUP 2 Power Vibrator

GROUP 3 Torchman (demolition only), Mortarmen

GROUP 4 Power Tamper

GROUP 5 Jackhammer & Airspade; Chainsaw, Swinging Stage and Boatswain Chair; Cement Gun Nozzleman; Hod Carrier;

Plasterer Tender, and Tunnel Man

GROUP 6 Tile Layers; Bottom Men

GROUP 7 Caisson Laborers; Dynamiters

GROUP 8 Asbestos abatement laborers, Toxic and hazardous waste removal laborers, Dosimeter (any device) monitoring nuclear exposure

----- LAB00152-
001 06/01/2025
LAKE COUNTY

Rates Fringes

LABORER

GROUP 1.....	\$ 51.40	36.94
GROUP 2.....	\$ 51.48	36.94
GROUP 3.....	\$ 51.50	36.94
GROUP 4.....	\$ 51.60	36.94
GROUP 5.....	\$ 51.60	36.94
GROUP 6.....	\$ 51.63	36.94
GROUP 7.....	\$ 51.73	36.94
GROUP 8.....	\$ 51.75	36.94
GROUP 9.....	\$ 51.60	36.94
GROUP 10.....	\$ 51.95	36.94
GROUP 11.....	\$ 51.60	36.94

LABORER CLASSIFICATIONS

GROUP 1: Building laborers; Plasterer tenders, General laborers (wrecking and demolition); Fireproofing and fire shop laborers

GROUP 2: Cement gun laborers and hose

GROUP 3: Chimney over 40 feet; Scaffold laborers; Wall men or wreckers

GROUP 4: Cement Gun nozzle (gunite) laborers

GROUP 5: Stone derrickmen and handlers

GROUP 6: Jackhammermen (tamperers & vibrators); Power driven concrete saws

GROUP 7: Firebrick & boiler laborer setters

GROUP 8: Chimney laborers (on fire brick); Caisson Diggers; Well Point system men

GROUP 9: Windlass and capstan persons

GROUP 10: Boiler setter plastic laborers

GROUP 11: Dosimeter (any device) monitoring nuclear exposure; Asbestos abatement laborers; Toxic and hazardous waste removal laborers

-----	PAIN0014-
002 06/01/2024	
GRUNDY, LAKE, and WILL COUNTIES	
Rates Fringes	
PAINTER	
Brush, Decorator, and	
Paperhanger.....\$ 53.05 33.91	
-----	PAIN0027-
003 06/01/2024	
Rates Fringes	
GLAZIER.....\$ 51.55 44.09	
-----	PAIN0030-
001 06/01/2024	
DE KALB, DU PAGE, KANE, KENDALL AND MCHENRY COUNTIES	
Rates Fringes	
PAINTER	
Brush, Drywall	
Taper/Finisher,	
Sandblaster, and Spray.....\$ 53.05 27.63	
-----	PLAS0005-
003 07/01/2015	
GRUNDY and WILL COUNTIES	
Rates Fringes	
PLASTERER.....\$ 42.25 26.65	
-----	PLAS0005-
006 07/01/2015	
DU PAGE COUNTY	
Rates Fringes	
PLASTERER.....\$ 42.25 26.65	
-----	PLAS0011-
008 06/01/2023	
DE KALB, KANE, KENDALL, AND MCHENRY COUNTIES	
Rates Fringes	
CEMENT MASON/CONCRETE FINISHER...\$ 50.70 40.60	
-----	PLAS0011-
012 06/01/2023	

GRUNDY AND WILL COUNTIES

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...\$ 46.25 45.10

----- PLAS0011-
014 06/01/2023

LAKE COUNTY

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...\$ 48.50 42.82

PLASTERER.....\$ 49.65 42.17

----- PLAS0803-
002 08/01/2010

DUPAGE COUNTY

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...\$ 38.00 24.03

----- PLUM0093-
001 06/01/2015

LAKE and McHENRY COUNTIES

Rates Fringes

PLUMBER.....\$ 45.76 26.92

----- PLUM0130-
002 06/01/2025

DUPAGE (Argonne National Laboratories and Fermi National Laboratory), GRUNDY
& WILL COUNTIES

Rates Fringes

PLUMBER.....\$ 60.50 39.02

----- PLUM0501-
001 12/01/2013

DUPAGE (excluding Argonne National Laboratory and Fermi National Laboratory),
KANE, and KENDALL (except the Mich-Wis Pumping Station in Milbrook, Silicas
and Plant and Village of Newark, excludes Yorkville) COUNTIES

Rates Fringes

PLUMBER/PIPEFITTER.....\$ 41.20 29.15

----- PLUM0597-
001 06/01/2023

DUPAGE (Argonne National Laboratories, and Fermi National Laboratory),
GRUNDY, LAKE, MCHENRY & WILL COUNTIES

Rates Fringes
PIPEFITTER.....\$ 55.00 38.62
----- R00F0011-
004 12/01/2024

DUPAGE, KANE, KENDALL, LAKE, MCHENRY, and WILL COUNTIES

Rates Fringes
ROOFER.....\$ 50.25 30.43
----- R00F0011-
009 12/01/2024

Rates Fringes
ROOFER.....\$ 38.50 27.23
----- * SFIL0281-
002 01/01/2026

DuPAGE, KANE, KENDALL, LAKE, McHENRY, and WILL COUNTIES

Rates Fringes
SPRINKLER FITTER.....\$ 63.20 36.55
----- SHEE0073-
003 06/01/2022

LAKE COUNTY

Rates Fringes
Sheet metal worker.....\$ 49.10 42.91
----- SHEE0073-
004 06/08/2018

LAKE COUNTY

Rates Fringes
Sheet Metal Worker
ALUMINUM GUTTER WORK.....\$ 31.32 37.02
----- SHEE0265-
001 06/01/2024

DU PAGE, GRUNDY, KANE, KENDALL, McHENRY, and WILL COUNTIES

Rates Fringes
SHEET METAL WORKER.....\$ 56.35 38.65
----- * TEAM0179-
DB-17

GRUNDY, KENDALL, and WILL COUNTIES

Rates Fringes

TRUCK DRIVER

2 or 3 Axle Trucks.....	\$ 46.12	0.30+a
4 Axle Trucks.....	\$ 46.27	0.30+a
5 Axle Trucks.....	\$ 46.47	0.30+a
6 Axle Trucks.....	\$ 46.67	0.30+a

FOOTNOTES:

- a. \$448.80 Health & Welfare per week, \$562.80 Pension per week.
- b. Lowboy is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and

accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0301-
001 06/01/2024

LAKE AND MCHENRY COUNTIES

Rates Fringes

TRUCK DRIVER

2-3 AXLES.....	\$ 44.54	13.40+a
4 AXLES.....	\$ 44.69	13.40+a
5 AXLES.....	\$ 44.89	13.40+a
6 AXLES.....	\$ 45.09	13.40+a

FOOTNOTES:

- a. \$500.00 per week pension.
- b. Lowboy is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track

Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0673-
003 06/01/2025

DU PAGE and KANE COUNTIES

Rates Fringes

TRUCK DRIVER

2-3 AXLES.....	\$ 45.31	0.30+a
4 AXLES.....	\$ 45.46	0.30+a
5 AXLES.....	\$ 45.66	0.30+a
6 AXLES.....	\$ 45.86	0.30+a

FOOTNOTE: a.

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Low-Boy is an additional \$1.50 per hour

Health and Welfare: \$453.20 per week

Penson: \$589.90 per week

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years -

2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier;

Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the

Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements

on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3 (g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination.

The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

- 1) Has there been an initial decision in the matter? This can be:
 - a) a survey underlying a wage determination
 - b) an existing published wage determination
 - c) an initial WHD letter setting forth a position on a wage determination matter
 - d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

"General Decision Number: IL20260020 01/02/2026

Superseded General Decision Number: IL20250020

State: Illinois

Construction Types: Building Landscape, Heavy Landscape, Highway Landscape and Residential Landscape

Counties: Boone, Cook, De Kalb, Du Page, Grundy, Henry, Kane, Kankakee, Kendall, Lake, McHenry, McLean, Ogle, Peoria, Rock Island, Tazewell, Will, Winnebago and Woodford Counties in Illinois.

LANDSCAPING WORK ON BUILDING, RESIDENTIAL, HEAVY AND HIGHWAY CONSTRUCTION PROJECTS.

Modification Number Publication Date
0 01/02/2026

ENGI0150-013 06/01/2024

BUILDING AND HIGHWAY CONSTRUCTION (LANDSCAPE WORK): The landscape work for the Landscape Equipment Operator excludes the preparation of sub-grade prior to application of finish landscape materials and the utilization of any equipment over one cubic yard.

BOONE, COOK, DUPAGE, GRUNDY, KANE, KENDALL, LAKE, MCHENRY, AND WILL COUNTIES

Rates Fringes

Operators:.....\$ 37.55 9.50+A+B Includes Angle Dozer, Small; Bobcat and other similar type machines, 1 cu yd or less; Chipping Machine; Combination Backhoe and Front End Loader 1 cu yd or less; Fork Lift Truck; Hi-Reach and High-Ranger;Hydraulic Boom with Clam;Log Skidder; Sttrow Blower and Seeder; Stump Machine;Tractors, Crawlers, Rubber Tire Tractors, Highlift Shovels or Front End Loaders 1 cu yd or less; Tree Spades, all; Utility Tractor and attachments, and Rubber Tire Front End loader or similar machine of 1 to 1.5 cu yd solely used for placement of large decorative boulders, trees with balled soil, and other decorative landscape material too large to be accommodated in a 1 cu yd bucket. All other equipment utilized for performing landscape work, tree trimming or removal of stees, and to install plants; transport trees; excavate plant pits; place soil and other landscape materials; and apply finish landscape material on subgrade prepared by others

FOOTNOTE:

A. Health and Welfare contribution is \$1,780.00 per month.

B. Paid Holidays: New Year's Day; Memorial Day; Fourth of July; Labor Day; Thanksgiving Day; and Christmas Day
provided that all such employees shall have in fact worked their regularly scheduled work day immediately preceding
and the regularly scheduled work day immediately succeeding the occurrence of such holiday.

----- ENGI0150-
023 06/01/2024

HIGHWAY CONSTRUCTION (LANDSCAPE WORK): The landscape work for the Landscape Equipment Operator excludes the preparation of sub-grade prior to application of finish landscape materials and the utilization of any equipment over one cubic yard.

HENRY, MCLEAN, OGLE, PEORIA, ROCK ISLAND, TAZEWELL, WINNEBAGO, and WOODFORD COUNTIES

Rates Fringes

Operators:.....\$ 37.55 9.50+A+B Includes the following:
Angle Dozer, Small; Bobcat and other similar type machines, 1 cu yd or less; Chipping Machine; Combination Backhoe and Front End Loader 1 cu yd or less; Fork Lift Truck; Hi-Reach and High-Ranger; Hydraulic Boom with Clam; Log Skidder; Straw Blower and Seeder; Stump Machine; Tractors, Crawlers, Rubber Tire Tractors, Highlift Shovels or Front End Loaders 1 cu yd or less; Tree Spades, all; Utility Tractor and attachments, and Rubber Tire Front End loader or similar machine of 1 to 1.5 cu yd solely used for placement of large decorative boulders, trees with balled soil, and other decorative landscape material too large to be accommodated in a 1 cu yd bucket. All other equipment utilized for performing landscape work, tree trimming or removal of stumps, and to install plants; transport trees; excavate plant pits; place soil and other landscape materials; and apply finish landscape material on subgrade prepared by others

FOOTNOTE:

A. Health and Welfare contribution is \$1,780.00 per month.

B. Paid Holidays: New Year's Day; Memorial Day; Fourth of July; Labor Day; Thanksgiving Day; and Christmas Day
provided that all such employees shall have in fact worked their regularly scheduled work day immediately preceding
and the regularly scheduled work day immediately succeeding the occurrence of such holiday.

----- LAB00032-
004 05/01/2025

HIGHWAY CONSTRUCTION

WINNEBAGO COUNTY

Rates Fringes

Landscape Laborer.....\$ 47.04 36.31
----- LAB00309-
006 01/01/2024

HIGHWAY CONSTRUCTION

ROCK ISLAND COUNTY

Rates Fringes

Landscape Laborer.....\$ 33.77 23.60
----- LAB00362-
003 05/01/2018

HIGHWAY CONSTRUCTION

MCLEAN COUNTY

Rates Fringes

Landscape Laborer.....\$ 31.08 24.43
----- LAB00538-
011 05/01/2024

HIGHWAY CONSTRUCTION

HENRY COUNTY

Rates Fringes

Landscape Laborer.....\$ 35.23 28.10
----- LAB00751-
004 05/01/2021

HIGHWAY CONSTRUCTION

KANKAKEE COUNTY

Rates Fringes

Landscape Laborer.....\$ 39.44 32.54
----- LAB00996-
004 05/01/2018

HIGHWAY CONSTRUCTION

PEORIA, TAZEWELL, AND WOODFORD COUNTIES

Rates Fringes

Landscape Laborer.....\$ 32.73 23.74
----- TEAM0026-
005 05/01/2025

MCLEAN (South of a straight line from where Route 24 intersects the Woodford County line in a Southeast direction to the South Southwest corner of Livingston County) COUNTY

Rates Fringes

TRUCK DRIVER

Group 1.....	\$ 45.29	25.42
Group 2.....	\$ 45.88	25.42
Group 3.....	\$ 46.15	25.42
Group 4.....	\$ 46.54	25.42
Group 5.....	\$ 47.64	25.42

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

----- * TEAM0179-
004 06/01/2025

GRUNDY, KENDALL, MCLEAN (North of a straight line starting at the intersection of McLean-Woodford Counties line & Route 24 in a Southeastern direction to the South Southwest corner of Livingston County), WILL, and WOODFORD (Northeast corner east of Route 51/251 & North of Route 24) COUNTIES

Rates Fringes

TRUCK DRIVER 2-3 AXLES.....	\$ 46.12	0.30+a
4 AXLES.....	\$ 46.27	0.30+a
5 AXLES.....	\$ 46.47	0.30+a
6 AXLES.....	\$ 46.67	0.30+a

FOOTNOTES:

a.Health and Welfare \$448.80 per week; Pension \$562.80 per week

b. Lowboy classification is an additional \$1.50 per hour
An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;

Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0179-
008 06/01/2024

KANKAKEE COUNTY

Rates Fringes

TRUCK DRIVER

2 or 3 axles.....	\$ 44.82	0.25+a
4 axles.....	\$ 44.97	0.25+a
5 axles.....	\$ 45.17	0.25+a

6 axles.....\$ 45.37 0.25+a

FOOTNOTES:

a. \$1055.60 per week.

Low-Boy work classification is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long;

Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0301-
001 06/01/2024

LAKE AND MCHENRY COUNTIES

Rates Fringes

TRUCK DRIVER

2-3 AXLES.....	\$ 44.54	13.40+a
4 AXLES.....	\$ 44.69	13.40+a
5 AXLES.....	\$ 44.89	13.40+a
6 AXLES.....	\$ 45.09	13.40+a

FOOTNOTES:

a. \$500.00 per week pension.

b. Lowboy is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years -

2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long;

Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic -

*Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0325-
004 06/01/2025

BOONE and WINNEBAGO COUNTIES

Rates Fringes

TRUCK DRIVER

2 - 3 Axles.....	\$ 48.47	26.70
4 Axles.....	\$ 48.62	26.70
5 Axles.....	\$ 48.82	26.70
6 Axles.....	\$ 48.93	26.70

FOOTNOTE: An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch

Gate Lockers; Batch Hopperman; Car and Truck Washers; Forkl Lifts and Hoisters; Helpers;

Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers

Pole Trailer, up to 40 feet; Power Mower Tractors; Skipman; Slurry Trucks, two-man operation; Teamsters; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading

equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator;

Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation

Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long, additional \$0.50 per hour; Slurry Trucks, one-man operation; Winch Trucks, 3

axles or more

*Mechanic*Truck Welder and Truck Painter; *Winter Rate: Between Dec. 15 and Feb. 28 the mechanic and welder rate shall be \$2.00 less than the scheduled scale. Truck Painter and Truck Welder classifications shall only apply in areas where and when it has been a past area practice;

Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories

Group 4 - Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- * TEAM0330-
004 06/01/2025

DEKALB and OGLE (North of Route 72/East of Route 251, Adeline, Byron, Creston, Dement, Forreston North of Route 72, Leaf River North of Route 72, Lynnvile, Monroe, Rochelle, & Scott) COUNTIES

Rates Fringes

TRUCK DRIVER

2-3 AXLES.....	\$ 44.83	0.30+a
4 AXLES.....	\$ 44.98	0.30+a
5 AXLES.....	\$ 45.18	0.30+a
6 AXLES.....	\$ 45.38	0.30+a

FOOTNOTE: a. Health and Welfare \$468.00 per week; Pension \$644.34 per week

Low Boy classification is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump, Turnapulls or Turnatrailers when

pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- TEAM0371-
004 05/01/2025

HENRY and ROCK ISLAND COUNTIES

Rates Fringes

TRUCK DRIVER

Group 1.....	\$ 45.35	25.72
Group 2.....	\$ 45.93	25.72
Group 3.....	\$ 46.25	25.72
Group 4.....	\$ 46.60	25.72
Group 5.....	\$ 47.71	25.72

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on

hazardous waste work.

----- TEAM0627-
004 05/01/2024

PEORIA, TAZEWELL, and WOODFORD COUNTIES

Rates Fringes

TRUCK DRIVER

Group 1.....	\$ 43.24	24.27	Group 2.....	\$
43.83	24.27			
Group 3.....	\$ 44.10	24.27		
Group 4.....	\$ 44.49	24.27		
Group 5.....	\$ 45.59	24.27		

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

----- * TEAM0673-
003 06/01/2025

DU PAGE and KANE COUNTIES

Rates Fringes

TRUCK DRIVER

2-3 AXLES.....	\$ 45.31	0.30+a
4 AXLES.....	\$ 45.46	0.30+a
5 AXLES.....	\$ 45.66	0.30+a
6 AXLES.....	\$ 45.86	0.30+a

FOOTNOTE: a.

An additional \$.20 per axle shall be paid for all vehicles with more than

six (6) axles.

Low-Boy is an additional \$1.50 per hour

Health and Welfare: \$453.20 per week

Penson: \$589.90 per week

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years -

2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances;

Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to

40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or

3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump

Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40

feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

----- TEAM0722-

OGLE (North of Route 72/East of Route 251) COUNTY

Rates Fringes

TRUCK DRIVER

Group 1.....	\$ 45.29	25.42
Group 2.....	\$ 45.88	25.42
Group 3.....	\$ 46.15	25.42
Group 4.....	\$ 46.54	25.42
Group 5.....	\$ 47.64	25.42

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

----- TEAM0731-
001 06/01/2025

COOK COUNTY - HEAVY AND HIGHWAY

Rates Fringes

TRUCK DRIVER

2 or 3 Axles.....	\$ 45.55	30.27
4 Axles.....	\$ 45.80	30.27
5 Axles.....	\$ 46.00	30.27
6 Axles.....	\$ 46.20	30.27

FOOTNOTES:

A. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

B. 900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years -

4 weeks paid vacation.

C. An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Low-Boy is an additional \$1.50 per hour
Health and Welfare: \$448.80 per week
Pension: \$562.80 per week

----- TEAM0786-
001 06/01/2025

COOK COUNTY - BUILDING AND RESIDENTIAL
Rates Fringes

TRUCK DRIVER

2 & 3 Axles.....	\$ 53.95	0.30+a
4 Axles.....	\$ 54.21	0.30+a
5 Axles.....	\$ 54.43	0.30+a
6 Axles.....	\$ 54.64	0.30+a

FOOTNOTES:

a. An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Low-Boy work classification is an additional \$1.50 per hour.
Health and Welfare: \$445.00 per week
Pension: \$408 per week.

B. 900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

----- SUIL1993-
001 01/19/1993

BUILDING CONSTRUCTION (LANDSCAPE WORK):

Rates Fringes

LABORER

BOONE, GRUNDY, KANE,
KENDALL, LAKE, MCHENRY, &
WILL COUNTIES

LANDSCAPE LABORERS.....\$ 7.25

COOK COUNTY

LANDSCAPE LABORERS.....\$ 7.25 LANDSCAPE PLANTSMAN.....\$ 9.80 1.82

DE KALB COUNTY

LANDSCAPE LABORERS.....\$ 7.25 LANDSCAPE OPERATORS.....\$ 7.25

LANDSCAPE PLANTSMAN.....\$ 9.66 .26
 DU PAGE COUNTY
 LANDSCAPE LABORERS.....\$ 7.25 LANDSCAPE PLANTSMAN.....\$ 9.04 1.16
 GRUNDY, LAKE & WILL
 COUNTIES
 LANDSCAPE DRIVER 2 & 3
 Axles.....\$ 11.86 2.81 LANDSCAPE PLANTSMAN.....\$ 12.00
 3.32 -----
 SUIL1993-002 01/19/1993

HEAVY CONSTRUCTION (LANDSCAPE WORK)

Rates Fringes

LABORER
 BOONE, GRUNDY, KANE,
 KENDALL, LAKE, MCHENRY &
 WILL COUNTIES:
 LANDSCAPE DRIVER, 2 & 3
 AXLES.....\$ 11.94 2.42 LANDSCAPE LABORERS.....\$ 7.25
 LANDSCAPE OPERATORS.....\$ 13.11 3.01 LANDSCAPE PLANTSMAN.....\$ 9.73
 2.05
 COOK COUNTY:
 LANDSCAPE DRIVER, 2 & 3
 AXLES.....\$ 9.93 1.89 LANDSCAPE LABORERS.....\$ 7.25
 LANDSCAPE OPERATORS.....\$ 10.98 2.12 LANDSCAPE PLANTSMAN.....\$ 10.08
 2.06
 DE KALB COUNTY:
 LANDSCAPE LABORERS.....\$ 7.25 LANDSCAPE OPERATORS.....\$ 7.25
 LANDSCAPE PLANTSMAN.....\$ 9.66 .26
 DU PAGE COUNTY:
 LANDSCAPE DRIVER, 2 & 3
 AXLES.....\$ 8.32 1.02 LANDSCAPE LABORERS.....\$ 7.25
 LANDSCAPE OPERATORS.....\$ 10.75 LANDSCAPE PLANTSMAN.....\$ 10.65
 ----- SUIL1993-
 003 01/19/1993

HIGHWAY CONSTRUCTION (LANDSCAPE WORK):

Rates Fringes

LABORER
 DE KALB COUNTY
 LANDSCAPE LABORERS.....\$ 7.25 LANDSCAPE OPERATORS.....\$ 7.25
 LANDSCAPE PLANTSMAN.....\$ 9.66 .26 KANKAKEE COUNTY:
 LANDSCAPE DRIVER.....\$ 8.75 .17 LANDSCAPE OPERATOR.....\$ 16.57
 3.56 PEORIA, TAZEWELL, &
 WOODFORD COUNTIES:
 TRUCK DRIVERS 2 & 3 AXLES..\$ 17.58 5.88

WELDERS - Receive rate prescribed for craft performing operation to which
 welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3 (g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION
"

SECTION 03 11 00
CONCRETE FORMWORK

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Forms for Cast-In-Place Concrete.
 - 2. Form Accessories.
 - 3. Openings for Other Work.
 - 4. Form Stripping.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ACI 117–Tolerances for Concrete Construction.
- B. ACI 301–Structural Concrete for Buildings.
- C. ACI 318–Building Code Requirements for Reinforced Concrete.
- D. ACI 347–Recommended Practice for Concrete Formwork.
- E. PS1–Construction and Industrial Plywood.
- F. NSF/ANSI 61-Drinking Water System Components.

1.03 DESIGN

- A. All formwork shall comply with ACI 347 and ACI 301.
- B. CONTRACTOR shall assume the responsibility for the complete design and construction of the formwork.

1.04 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00–Submittals for form ties, form coatings, form liners (if any), and any other form accessories.

PART 2–PRODUCTS

2.01 FORMS

- A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which will produce concrete which meets the specified requirements. The type, size, quality, and shape of all materials of which the forms are made are subject to the review of ENGINEER.
- B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

2.02 FORM TIES–NONREMOVABLE

- A. Internal wall ties shall contain positive stops at the required wall thickness. The exterior clamp portions of the tie shall be adjustable in length. Ties shall have cones on the water side of water-containing structures. Ties shall also have cones on the exterior side of all structures which have PVC water-stopped construction joints. Ties shall provide a positive disconnection on both ends 1 to 1 1/2 inches inside the finished face of the concrete.
- B. All wall ties used in the placement of structures which have PVC or hydrophilic water-stopped construction joints shall contain integral waterstops. All such ties shall be crimped or deformed in such a manner that the bond between concrete and tie cannot be broken in removal of the outer units. This portion of the tie shall not be removed prior to 24 hours after completion of the concrete placement.
- C. The use of wood spacers and wire ties will not be approved.

2.03 FORM COATINGS

- A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.
- B. Form release agents for potable water containing structures shall be compliant with NSF/ANSI 61.

2.04 CHAMFER STRIPS

- A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

2.05 KEYWAYS

- A. Keyways shall be formed with wood inserts.

PART 3–EXECUTION

3.01 CONSTRUCTION

- A. Forms shall conform to the shape, line, grade, and dimensions as shown on the Drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape. Spacing of ties shall be recommended by the tie manufacturer.
- B. Formwork and finished concrete construction shall meet the tolerances specified in ACI 117.
- C. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the Drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.
- D. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.
- E. At the request of ENGINEER, temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before depositing concrete.
- F. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.
- G. Provide top forms for inclined surfaces where the slope is too steep to place and vibrate concrete.
- H. Bevel wood inserts for forming keyways (except in expansion joints where inserts shall have square edges), reglets, recesses, and the like to allow for ease of removal. Inserts shall be securely held in place prior to concrete placement. Unless otherwise shown, chamfer strips shall be placed in the angles of the forms to provide 3/4-inch bevels at exterior edges and corners of all exposed concrete.
- I. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.
- J. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to review of ENGINEER.

3.02 FORM REMOVAL

- A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.

- B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete.
- C. Forms shall not be removed before the expiration of the minimum times for Wall and Vertical Faces: 24 hours, or until the concrete has attained its minimum 28-day design strength as confirmed by concrete cylinder tests, unless specifically authorized by ENGINEER.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes providing complete, in-place, all steel and fibers required for reinforcement of cast-in-place concrete as shown on the Drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. Applicable standards listed in this section include, but are not necessarily limited to the following:
 - 1. ACI 315—Manual of Standard Practice for Detailing Reinforced Concrete Structures.
 - 2. ACI 318—Building Code Requirements for Reinforced Concrete.
 - 3. ASTM A615—Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 4. ASTM A996—Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcing.
 - 5. ASTM C1116—Standard Specification for Fiber-Reinforced Concrete.
 - 6. CRSI—Manual of Standard Practice.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00—Submittals.
- B. Provide complete shop drawings of all material to be furnished and installed under this section:
 - 1. Before fabrication of the reinforcement is begun, CONTRACTOR shall obtain the approval of ENGINEER on reinforcing bar lists and placing drawings.
 - 2. These drawings and lists shall show in detail the number, size, length, bending, and arrangement of the reinforcing. Reinforcing supports shall also be located on the shop drawings.
 - 3. Shop drawings shall be in accordance with ACI 315.

1.04 PRODUCT HANDLING

- A. Delivery:
 - 1. Deliver reinforcement to the job site bundled, tagged, and marked.
 - 2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2-PRODUCTS

2.01 MATERIALS

- A. Reinforcing bars shall comply with ASTM A615 or A996 Type R, Grade 60. Reinforcing bars required to be welded shall be ASTM A706 low alloy.
- B. Reinforcement supports, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
 - 1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
 - 2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
 - 3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.
 - 4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.
- C. Fibrous Reinforcing:
 - 1. Fibrous concrete reinforcement shall be Fibermesh 300, manufactured by Propex Concrete Systems, or equal.
 - 2. Reinforcement shall be 100% virgin polypropylene fibrillated, multi-length graded fiber containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement.
 - 3. Physical Characteristics:
 - a. Specific Gravity: 0.91.
 - b. Fiber Length: Multidesign gradation.
- D. Mechanical Splices and Threaded Couplers:
 - 1. Mechanical splices shall be Zap Screwlok by Bar Splice Products, Inc., or equal.
 - 2. Threaded couplers and dowel bar replacements shall be Dowel Bar Splicer System by Dayton/Richmond, or equal.
 - 3. Mechanical splices and couplers shall be capable of developing at least 125% of the yield strength of the reinforcing bar.

2.02 FABRICATION

- A. General:
 - 1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
 - 2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
 - 3. Unless otherwise shown on the Drawings, all end hook dimensions shall conform with "ACI Standard Hooks."

- B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
 - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
 - 2. Bend or kinks not indicated on Drawings or final shop drawings.
 - 3. Bar with reduced cross section because of excessive rusting or other cause.

PART 3—EXECUTION

3.01 INSPECTION

- A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.
- B. Correct conditions detrimental to the proper and timely completion of the work.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with the specified standards for details and methods of placing reinforcement and supports.
 - 2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials that reduce or destroy bond with concrete.
- B. Placing Reinforcement:
 - 1. All reinforcing shall be placed in accordance with Contract Drawings and with shop drawings stamped and approved by ENGINEER.
 - 2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
 - 3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
 - 4. Unless otherwise shown on the Drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
 - a. Three inches of cover where the concrete is placed directly against ground.
 - b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
 - c. One-inch cover in slabs and walls not exposed to weather, liquid, or the ground.
 - d. One and one-half-inch cover in beams, girders, and columns not exposed to weather, liquid, or the ground. This cover applies to beam stirrups and column ties where applicable.
 - 5. Reinforcement shall be positioned within $\pm 3/8$ inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be $\pm 1/2$ inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
 - 6. Bars shall be securely tied at all intersections, except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To avoid interference with embedded items, bar spacing may be varied slightly if acceptable to ENGINEER. Tack welding of reinforcing will not be permitted.

7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the Drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.
 9. Wall reinforcing mats shall be secured in a vertical plane by providing clearance from forms with bar supports and by using Z-shaped bars at ± 4 feet on center wired between two mats of steel, spacing and staying both of them. Nails shall not be driven into the forms to support reinforcement and neither shall wire for this purpose come in contact with the forms. Alternate top transverse bars in slab shall be supported by individual bar chairs at approximately 3 foot 0-inch centers. Bottom longitudinal bars shall be supported by continuous bar chairs at approximately 4 foot 0-inch centers.
 10. If carrier bars are to be used, CONTRACTOR shall provide reinforcing bars for this purpose in addition to the reinforcing called for by the Drawings and Specifications.
 11. Reinforcement bars used as grade pins shall not be tied to or used to support structural reinforcement. Grade pins shall either be completely removed or lowered to provide the specified clear cover from the slab surface.
- C. Reinforcement Supports:
1. Strength and number of supports shall be sufficient to carry reinforcement.
 2. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support.
 3. Do not use supports as bases for runways for concrete-conveying equipment and similar construction loads.
- D. Splices:
1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
 2. Lap splices in reinforcing shall be provided as shown on the Drawings. Where lap splice lengths are not shown on the Drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.
 3. Adjacent splices of tangential bars in circular slabs and horizontal bars in circular walls shall be staggered a minimum of one full lap splice length or 3 feet, whichever is greater, unless otherwise shown. Stagger dimension shall be measured from center to center of lap splices.
 4. For circular walls, horizontal bar lap splices shall not coincide in vertical arrays more frequently than every third bar.
 5. Mechanical splices and threaded dowel bar inserts may be used where acceptable to ENGINEER.
- E. Embedded Items:
1. Allow other trades to install embedded items as necessary.
 2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.
- F. Minimum Reinforcing: Where reinforcing is not shown, provide a minimum of No. 4 at 8-inch centers each way in members 10 inches or less in thickness and No. 5 at 12-inch centers each way in each face in members greater than 10 inches thick.

G. Fibrous Reinforcing:

1. Fibrous concrete reinforcing shall be used in all building interior slab-on-grade concrete and all precast concrete topping, and where shown on the Drawings.
2. Add fibers at a minimum rate of 1.5 pounds per cubic yard.
3. Mix concrete in strict accordance with reinforcement manufacturer's recommendations.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. All cast-in-place concrete as shown, except as noted otherwise.
 - 2. Expansion joint fillers, bonding agents, patching mortars, curing compounds, nonshrink grout, floor sealer, and other related items and accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ACI 211.1—Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 301—Specifications for Structural Concrete.
- C. ACI 304R—Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- D. ACI 305R—Guide to Hot Weather Concreting.
- E. ACI 306R—Guide to Cold Weather Concreting.
- F. ACI 308—Specification for Curing Concrete.
- G. ACI 309—Guide for Consolidation of Concrete.
- H. ACI 318—Building Code Requirements for Structural Concrete and Commentary.
- I. ASTM C31—Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- J. ASTM C33—Standard Specification for Concrete Aggregates.
- K. ASTM C39—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C40—Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
- M. ASTM C88—Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- N. ASTM C94—Standard Specification for Ready-Mixed Concrete.
- O. ASTM C143—Standard Test Method for Slump of Hydraulic-Cement Concrete.
- P. ASTM C150—Standard Specification for Portland Cement.

- Q. ASTM C156–Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.
- R. ASTM C172–Standard Practice for Sampling Freshly Mixed Concrete.
- S. ASTM C231–Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- T. ASTM C260–Standard Specification for Air-Entraining Admixtures for Concrete.
- U. ASTM C309–Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- V. ASTM C494–Standard Specification for Chemical Admixtures for Concrete.
- W. ASTM C595–Standard Specification for Blended Hydraulic Cements.
- X. ASTM C618–Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- Y. ASTM C652–Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- Z. ASTM D994–Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- AA. ASTM D1752–Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00–Submittals.
- B. Submit the following information:
 - 1. Gradation of fine and coarse aggregate–ASTM C33.
 - 2. Specific gravity and dry rodded density of each aggregate.
 - 3. Test of deleterious substances in fine and coarse aggregate–ASTM C33.
 - 4. Design mix of each individual concrete mix to be used.
 - 5. Previous test results or trial batch results with 7- and 28-day compressive strengths for each concrete mix proposed.
 - 6. Certified mill test results for cement identifying brand, type, and chemistry of cement to be used.
 - 7. Brand, type, principal ingredient, and amount of each admixture to be used.
- C. It is important that the above data be submitted to ENGINEER well in advance of anticipated concreting operations to avoid any delay in construction.

PART 2-PRODUCTS

2.01 CEMENT

- A. Cement shall be Portland cement Type I/II conforming to ASTM C150 or Portland limestone cement Type IL conforming to ASTM C595. All cement shall be the product of one reputable manufacturer and mill.
- B. Cement shall be stored in a dry, weathertight, properly ventilated structure with the floor raised not less than 1 foot above the ground.

2.02 FLY ASH

- A. All fly ash used as an admixture in Portland cement or Portland limestone cement concrete shall be Class C or F conforming to the requirements of ASTM C618.

2.03 AGGREGATE

- A. All aggregates shall be washed and shall consist of natural sand, gravel, or crushed rock and shall have clean, hard, durable, uncoated grains of strong minerals. The amounts of deleterious substances present in the fine and coarse aggregate expressed in percentages by weight shall not exceed the following:

Deleterious Substance	Aggregate	
	Fine	Coarse
Clay Lumps and Friable Particles	3.0	3.0
Coal and Lignite	0.5	0.5
Mineral finer than No. 200 sieve	3.0	
Soft Fragments	3.0	3.0
Chert*	---	5.0
Sum of Chert and Clay Lumps		5.0

* Material classified as chert and having a bulk specific gravity of less than 2.45. The percentage of chert shall be determined on the basis of the weight of chert in the sample retained on a 3/8-inch sieve divided by the weight of the total sample.

- B. The combined amount of all deleterious substances in an aggregate shall not exceed 5% of the weight of the aggregate.
- C. If requested by ENGINEER, sodium sulfate soundness tests (ASTM C88) shall be performed on the aggregate. When the aggregate is subjected to 5 cycles, the weight loss shall not exceed 12%. Samples of proposed aggregates shall be submitted to an independent laboratory for testing in advance of concrete work. All testing shall be performed in accordance with ASTM C33. Certified test results shall be submitted to ENGINEER confirming that aggregate complies with all stated specifications. Report shall identify source of aggregate and absorbed water.

- D. Fine aggregate shall be well-graded from coarse to fine and shall conform to the following requirements:

Percentage by Weight	
Passing 3/8-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	80-100
Passing No. 16 sieve	50-85
Passing No. 30 sieve	25-60
Passing No. 50 sieve	5-30
Passing No. 100 sieve	0-10

- E. Gradation of fine aggregate shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. The fineness modulus shall be not less than 2.3 or more than 3.1, nor shall the fineness modulus of any sample vary by more than +0.20 from the fineness modulus of the representative sample used in proportioning the concrete.
- F. If requested by ENGINEER, fine aggregate shall be subjected to the color-metric test for organic impurities (ASTM C40) and shall not produce a color darker than Figure 1, unless they pass the mortar strength test. Aggregate producing color darker than Figure 2 shall not be used in any event.
- G. Coarse aggregate shall be well-graded from coarse to fine, and when tested by laboratory sieves having square openings, shall conform to the following requirements:

	Percentage by Weight Aggregate	
	3/4-Inch Stone	1 1/2-Inch Stone
Passing 2-inch sieve	---	100
Passing 1 1/2-inch sieve	---	90-100
Passing 1-inch sieve	100	20-55
Passing 3/4-inch sieve	90-100	0-15
Passing 3/8-inch sieve	20-55	0-5
Passing No. 4 sieve	0-10	---
Passing No. 8 sieve	0-5	---

- H. The 3/4-inch aggregate shall be used in concrete members no thinner than 4 inches and less than 10 inches thick. A blend of 3/4-inch and 1 1/2-inch aggregate shall be used in members 10 inches thick and thicker with the 3/4-inch aggregate comprising between 35% and 65% of the total coarse aggregate. When members thinner than 10 inches are placed monolithically with members thicker than 10 inches, the aggregate requirements for the thinner member shall apply.
- I. Aggregates must be allowed to drain for at least 12 hours before being used. The ground upon which aggregates are stored must be hard, firm, well-drained, and free from all vegetable matter. Various sizes of aggregates must be stored separately, and if they have become contaminated or merged with each other, they shall not be used.

2.04 WATER

- A. Water used in mixing concrete shall be clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious substances.

2.05 ADMIXTURES

- A. Water Reducing Admixture shall be Master Pozzolith® 200 by Master Builders Solutions, Daracem 19 by Grace, or equal. Water reducing admixture shall conform to ASTM C494, Type A and Type F. Water reducing admixture shall not reduce durability, shall increase strength 10%, and shall not affect bleeding characteristics over reference mix.
- B. Air-Entraining Admixture shall be equal to MasterAir® AE 90 by Master Builders Solutions, Darex by Grace Construction Products, or equal. Air-entraining admixture shall conform to ASTM C260.
- C. No other admixture will be allowed without written approval of ENGINEER. All admixture shall be compatible with cement, aggregate, and water used.

2.06 PROPORTIONING

- A. The proportions of aggregate to cement shall be such as to produce a workable mixture that can be thoroughly compacted and that will work readily in the forms and around reinforcement without permitting materials to segregate or excess water to collect on the surfaces. The combined aggregates shall be such that when separated on the No. 4 sieve, the weight passing the sieve shall not be less than 30% nor greater than 50%.
- B. Concrete of various classes shall have the following maximum water/cement or water/(cement + fly ash) ratio minimum compressive strengths at 28 days and minimum cement and fly ash contents:

Class	Maximum Water/ Cement or Water/ (Cement+Fly Ash)	Minimum 28 Day Strength-Pounds per Square Inch	Cement Content-Pounds per Cubic Yard	Fly Ash- Pounds per Cubic Yard	
				Type C	Type F
A	0.45	4,000	564	---	---
A-FA	0.45	4,000	480	110	125
X	---	2,000	376	---	---

- C. Unless noted otherwise on the Drawings or in the Specifications, all other concrete shall be Class A or Class A-FA concrete.
- D. All concrete mixes shall be designed for a strength of 15% above that specified to allow for job variations. All mixes shall be designed in accordance with ACI 211.1 by a qualified concrete engineer or qualified laboratory technician. Required materials test data shall be submitted with design mixes for review and approval by ENGINEER. Mix computations shall be submitted if requested by ENGINEER.
- E. The slump for all concrete shall be 3 inches and concrete with a slump within the range of 2 to 3 1/2 inches will be acceptable, unless otherwise stated.

- F. A water-reducing admixture shall be used in all concrete. A qualified representative of the manufacturer shall be available to assist in proportioning the concrete, advise on the proper addition of the admixture to the concrete, and advise on adjustments of concrete proportions to suit job conditions.
- G. An air-entraining admixture shall be used in all concrete except as noted. Air content shall be tested by the pressure method as outlined in ASTM C231 and shall be between 4% to 7% by volume. An air-entraining admixture is not required for concrete patching and for concrete floors, equipment pads, and supports in interior heated buildings where the concrete will be protected from freezing during and after construction.
- H. CONTRACTOR shall submit to ENGINEER concrete cylinder compressive strength results from previous projects for the same concrete mixes proposed on the current project. If this information is not available, one cubic yard trial batches of each individual mix proposed for use shall be made prior to use in the work. Four test cylinders shall be made for each trial batch, two to be tested at 7 days and two at 28 days. The trial batches shall be made preceding actual placement operations so that the results of the 7-day tests can be obtained. All costs for material, equipment, and labor incurred during design of concrete mixes shall be borne by CONTRACTOR.
- I. All aggregates shall be measured by weight. The concrete mixer is to be equipped with an automatic water-measuring device that can be adjusted to deliver the desired amount of water.

2.07 JOINT FILLER

- A. Expansion joints shall have standard 1/2-inch-thick cork expansion joint filler, W. R. Meadows, or equal, meeting ASTM D1752–Type II. Exceptions to this are expansion joints in exterior concrete walks and between concrete walks and other structures which shall be asphalt expansion joint filler, 1/2-inch-thick, Grace, W.R. Meadows, or equal, meeting ASTM D994.

2.08 BONDING AGENT

- A. Bonding agent for bonding new concrete to existing concrete at construction joints and for bonding concrete overlays to existing concrete shall be a liquid latex product meeting ASTM C1059, Type II. Acceptable products include Euroweld 2.0 by Euclid Chemical, Acrylic Bonding Agent J40 by Dayton Superior, or equal.

2.09 PATCHING ADDITIVE

- A. Acceptable manufacturers include MasterEmaco® A 660 by Master Builders Solutions, Sonocrete by Sonneborn Contech Co., or equal.

2.10 NONSHRINK GROUT

- A. Acceptable manufacturers include Dayton Superior, Master Builders Solutions, or equal. Grout shall be nonshrink, nonmetallic and shall achieve a strength of 7,500 psi in 28 days.

2.11 CURE-SEAL HARDENER

- A. Penetrating sealer for interior building floors shall be Ashford Formula by Curecrete Chemical Company, Inc., or equal. See finish schedule for locations to be used.

PART 3-EXECUTION

3.01 MIXING

- A. Ready-mixed concrete shall be batched, mixed, and delivered in accordance with ASTM C94 and ACI 304R. In general, concrete shall be mixed 50 revolutions at plant, 20 upon arrival at site, and 20 each time water is added; maximum of 110 revolutions at mixing speed. Concrete shall be delivered and discharged within 1 1/2 hours or before the drum has revolved 300 times after introduction of water to the cement and aggregates or the cement to the aggregates. Truck mixers shall be equipped with drum revolution counters. In no event shall concrete which has taken its initial set be allowed to be used. Retempering of concrete is not permitted.
- B. A representative of ENGINEER may be at the batching plant periodically to observe the batching and mixing.
- C. No water shall be added on the job unless required by CONTRACTOR and with the knowledge of ENGINEER; the amount of water, if added, shall be recorded on all copies of the delivery tickets. If water is added, CONTRACTOR shall verify that the required water-cement ratio is not exceeded.
- D. Concrete shall have a temperature not less than 60°F nor more than 80°F as delivered to the jobsite.
- E. With each load of concrete, CONTRACTOR shall obtain delivery tickets and shall make these tickets available for review by ENGINEER. Delivery tickets shall provide the following information:
 - 1. Date.
 - 2. Name of ready-mix concrete plant, job location, and CONTRACTOR.
 - 3. Type of cement and admixtures, if any.
 - 4. Specified cement content in sacks per cubic yard of concrete and approved concrete mix number or designation.
 - 5. Amount of concrete in load, in cubic yards.
 - 6. Water-cement ratio.
 - 7. Water added at job, if any.
 - 8. Truck number and time dispatched.
 - 9. Number of mixing drum revolutions.
- F. For job-mixed concrete, all concrete materials shall be mixed in a machine batch mixer for at least 1 1/2 minutes after all ingredients are in the mixer and shall continue until there is a uniform distribution of the materials and the mass is uniform in color and homogeneous. The mixer shall not be loaded beyond the capacity given by the manufacturer and shall be rotated at the speed recommended by the manufacturer. The mixer is to be provided with positive timing device that will positively prevent discharging the mixture until the specified mixing time has elapsed.

3.02 JOINTS

- A. CONTRACTOR shall place all joints as shown on the Drawings or specified herein. If acceptable to ENGINEER, CONTRACTOR may, at its own expense, place construction joints in addition to and at places other than those shown on the Drawings. Unless otherwise shown, all joints shall be straight, truly vertical or horizontal, and proper methods shall be employed to obtain this result.
- B. Where construction joints are not shown on the Drawings or specified elsewhere, CONTRACTOR shall provide construction joints in walls as follows:
 - 1. Vertical construction joints at 60 feet on center maximum but not more than 15 feet from corners or intersections.
 - 2. Horizontal construction joints at 18 feet on center maximum for walls 12 inches or more in thickness.
 - 3. Horizontal construction joints of 8 feet on center maximum for walls 10 inches or less in thickness.
- C. Immediately after completion of the first pour at a joint, the concrete surface, reinforcement, and waterstop projecting beyond the joint shall be thoroughly cleaned and laitance removed. The waterstops shall not be disturbed after the concrete in the first pour at a joint has set. Concrete around waterstops shall be thoroughly compacted by hand spading and vibrating. Immediately before the second pour, all extraneous matter shall be removed from the joint, the waterstop and steel cleaned, and the surface thoroughly wetted.
- D. Concrete at all joints shall have been in place at least 48 hours before abutting concrete is placed. At least two hours must elapse after depositing concrete in columns or walls before depositing in beams, girders, or slab supported thereon. Beams, girders, brackets, column capital, and haunches shall be considered as part of the floor system and shall be placed integrally therewith.

3.03 BONDING TO EXISTING CONCRETE

- A. When placing new concrete adjacent to existing concrete, the existing concrete shall be thoroughly roughened, cleaned, and saturated with water 24 hours before pouring new concrete. Existing concrete is defined as concrete more than six months old. At time of new pour, remove any standing water and apply bonding agent. Bonding agent shall be applied in accordance with manufacturer's recommendations.

3.04 PATCHING EXISTING CONCRETE

- A. When patching existing concrete, remove poor concrete until firm hard concrete is exposed; roughen and clean surface of the existing concrete, clean any exposed reinforcing bars, and pour new concrete. Concrete finish shall match existing concrete. New concrete shall be 4,000 psi 28-day strength mixed with patching additive, mixed according to manufacturer's instructions. Concrete shall not be air-entrained.

3.05 EMBEDDED ITEMS IN CONCRETE

- A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.
- B. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

- C. Embedded items shall be positioned accurately and supported against displacement. Reinforcing bars shall clear embedded items a minimum of 2 inches.

3.06 PLACING CONCRETE

- A. Before placing concrete, all equipment, forms, ground, reinforcements, and other surfaces with which the concrete will come in contact are to be thoroughly cleaned of all debris, ice, and water. Ground shall be wetted prior to placement of concrete on it.
- B. After reinforcement is placed and before concrete is placed over it, ENGINEER shall be allowed sufficient time to observe the reinforcing.
- C. Unless otherwise authorized by ENGINEER, all concrete shall be placed in the presence of ENGINEER.
- D. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods that will prevent the segregation or loss of materials. Chuting for conveying purposes must be accomplished in such a manner as to prevent segregation or loss of materials. Receiving hoppers shall be installed at the chute discharge and at no point in its travel from the mixer to place of final deposit shall the concrete pass through a free vertical drop of more than 3 feet. Elephant trunks or tremies shall be used in all wall pours to prevent coating of forms and reinforcing bars.
- E. Care shall be taken to avoid an excess of water on the concrete surface. Excess water shall be drained or otherwise removed from the surface. Dry cement or a mixture of cement and sand shall not be sprinkled directly on the surface to absorb water.
- F. Concrete in wall and beam pours shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness. Each layer shall be well worked into the preceding layer while both layers are still soft.
- G. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation from rehandling or flowing. The maximum allowable lateral movement of the concrete after being deposited is 3 feet. Once concreting is started, it shall be carried on as a continuous operation until the placing of the section or panel is completed.
- H. All concrete shall be placed with the aid of mechanical vibrating equipment in accordance with ACI 309. In congested areas, vibration shall be supplemented by hand spading adjacent to the forms. Vibration should secure the desired results within 5 to 15 seconds at intervals of 18 inches apart maximum. The vibrator shall penetrate the preceding layer of concrete. Vibrators shall have a frequency of not less than 10,000 impulses per minute when in operation submerged in concrete.
- I. A sufficient number of spare vibrators shall be kept in ready reserve to provide adequate vibration in case of breakdown of those in use.
- J. In placing concrete in beams where it is intended to be continuous and monolithic with the slab above, a delay to provide for settlement of the deep concrete shall be scheduled before placing the upper concrete in the slab. The length of delay shall be as long as possible and still permit the revibration of the deep concrete.
- K. Concrete is not to be placed under water. A suitable means shall be provided for lowering the water level below surfaces upon which concrete is to be placed. This may require

excavating approximately 12 inches below the bottom of the concrete surface and refilling with gravel and compacting. The groundwater shall not be allowed to rise to the bottom of the concrete until 24 hours after the concrete pour has been completed. Water shall not be allowed to fall upon or run across the concrete during this period.

- L. No extra payment will be allowed for dewatering, undercutting, and gravel fill.

3.07 MOIST CURING

- A. All concrete shall be maintained in a moist condition for at least 7 days after being deposited except that for high-early strength concrete, a 3-day period will be sufficient. Moist curing shall be accomplished by one of the following methods:
 - 1. Wood forms left in place and kept wet at all times. If wood forms are not going to be kept wet or if metal forms are used, they shall be removed as soon as practicable and other methods of moist curing shall be started without delay.
 - 2. Use of a curing compound conforming to ASTM C309, Type I as approved by ENGINEER. Curing compound shall be applied at a uniform rate as indicated by the manufacturer sufficient to comply with the requirements of the test water retention of ASTM C156. Curing compound applied to vertical concrete surfaces after forms are removed shall be specially adapted to provide required coverage on the vertical surface. On nonformed surfaces, the curing compound shall be applied immediately after the disappearance of the water sheen after finishing of the concrete. Curing compound shall not be used on concrete surfaces that are to be painted, receive ceramic tile or resilient flooring, or be waterproofed. The curing compound for potable water structures shall be certified per NSF/ANSI-61. Care shall be taken not to get curing compound on construction joints, reinforcing steel, and other surfaces against which new concrete will be poured.
 - 3. Use of plastic film. Plastic film shall have a minimum thickness of 4 mils. It shall be placed over the wet surface of the fresh concrete as soon as possible without marring the surface and shall be weighted so that it remains in contact with all exposed surfaces of the concrete. All joints and edges shall be lapped and weighted. Any tears in the film shall be immediately repaired.
 - 4. Application of wet coverings weighing 9 ounces per square yard such as burlap, cotton mats, or other moisture-retaining fabrics. The covering system shall include two layers and shall be kept continuously moist so that a film of water remains on the concrete surface throughout the curing period.
 - 5. Use of an approved waterproof curing paper. Edges of adjacent sheets shall be overlapped several inches and tightly sealed.
 - 6. Ponding of water or continuous sprinkling of water is permitted. Sprinkling at intervals will not be permitted.
 - 7. Construction joints shall be moist cured by one of the methods listed above except by Method "2."
- B. The use of moist earth, sand, hay, or another method that may discolor hardened concrete will not be permitted.

3.08 HOT WEATHER CONCRETING

- A. When the atmospheric temperature exceeds 80°F during concrete placement, this section and ACI 305 shall apply in addition to all other sections of the specifications.
- B. The temperature of the delivered concrete shall not exceed 85°F.

- C. Care shall be exercised to keep mixing time and elapsed time between mixing and placement at a minimum. Ready-mix trucks shall be dispatched so as to avoid delay in concrete placement, and the work shall be organized to use the concrete promptly after arrival at the jobsite.
- D. The subgrade, forms, and reinforcing shall be sprinkled with cool water just prior to placement of concrete. Prior to placing concrete, there shall be no standing water or puddles on the subgrade.
- E. If approved by ENGINEER, an admixture for retarding the setting of the concrete may be used.
- F. Exposed concrete surfaces shall be carefully protected from drying. Continuous water curing is preferred. Curing compounds shall be white pigmented.

3.09 COLD WEATHER CONCRETING

- A. Conditions of this section shall apply, in addition to all other sections of the specifications, when placing concrete in cold weather. Cold weather is defined as a period when, for more than three successive days, the average daily temperature drops below 40°F. When temperatures above 50°F occur during more than half of any 24-hour period, the period will no longer be regarded as cold weather. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. Cold weather concreting shall conform to all requirements of ACI 306.1, except as modified by the requirements of these specifications.
- B. Detailed procedures for the production, placement, protection, curing, and temperature monitoring of concrete during cold weather shall be submitted to ENGINEER. Cold weather concreting shall not begin until these procedures have been reviewed for conformance with ACI 306.1.
- C. All concrete materials, forms, ground, mixing equipment, and other surfaces with which the concrete is to come in contact shall be free from frost, and the temperature of contact surfaces shall be 35°F or above. Ground upon which concrete is to be placed shall not be frozen at any depth.
- D. The mixing water and aggregates shall be heated and when entering the mixer shall have temperatures not exceeding 175°F and 80°F, respectively. Concrete temperature as mixed shall not exceed 80°F and shall typically be between 55°F and 70°F. Concrete, when placed in the forms, shall have a temperature of not less than 50°F.
- E. Freshly placed concrete shall be protected by adequate covering, insulating, or housing and heating. If heating is used, ambient temperature inside the housing shall be maintained at a minimum of 70°F for 3 days or 50°F for 5 days. The maximum ambient temperature during curing shall not exceed 80°F. If insulating methods are used, recommendations contained in ACI 306R shall be followed. Surface temperature shall be maintained at 50°F for 7 days. After the curing period, the temperature of the concrete shall be reduced uniformly at a rate not to exceed 40°F per 24 hours until outside air temperature is reached. Heating of enclosure shall continue if it is anticipated that the outside air temperature will drop more than 20°F in the next 24 hours. The concrete temperature shall be obtained by attaching a thermometer provided by CONTRACTOR to the concrete surface. Concrete shall be kept moist.

- F. If heating is used, the housing shall be constructed weathertight and shall be constructed in a manner that will provide uniform air circulation and air temperatures over the complete concrete area that is being cured. Special attention shall be given to the edges and ends of a concrete pour with the housing extending at least 5 feet beyond any concrete surface being protected. The housing shall be in place and heat applied within 2 hours after concrete placement.
- G. Heating may be by steam or hot air. Heaters shall be vented to outside of the housing. Open burning salamanders will not be permitted. Heating devices shall not be placed so close to the concrete as to cause rapid drying or discoloration from smoke.
- H. If heating is used, CONTRACTOR shall provide sufficient 24-hour inspection of the heaters to provide compliance with the above-specified temperature requirements during the curing period. CONTRACTOR shall provide maximum-minimum thermometers for ENGINEER's use.
- I. The use of calcium chloride, salts, or other chemical admixtures for the prevention of freezing is prohibited.
- J. Salts or other deleterious materials shall not be used on temporary or permanent structures above concrete surfaces that are being placed, finished, or cured.

3.10 FINISHING

- A. Flat Work:
 - 1. Floated Finish: Place, consolidate, strike off, and level concrete eliminating high spots and low spots. Do not work concrete further until it is ready for floating. Begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disk float when the bleed water sheen has disappeared and the surface has stiffened sufficiently to permit the operation. Immediately refloat the slab to a uniform texture.
 - 2. Light Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks.
 - 3. Hard Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a ringing sound is produced as the floor is troweled.
 - 4. Tolerance for concrete floors shall be 1/4 inch within 10 feet in any direction. Straight edge shall be furnished by CONTRACTOR.
 - 5. Broom or Belt Finish: Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
 - 6. The above finishes shall be used in the following locations:
 - a. Float Finish: Surface to receive roofing, waterproofing, or sand bed terrazzo.
 - b. Light Troweled Finish: Submerged tank slabs.
 - c. Hard Troweled Finish: Building floors.
 - d. Broom or Belt Finish: Exterior slabs, sidewalks, tops of walls, and tank slabs to receive grout topping.
- B. Formed Surfaces:
 - 1. Within 2 days after removing forms and prior to application of a curing compound, all concrete surfaces shall be observed and any poor joints, voids, stone pockets, or other defective areas shall be patched at once before the concrete is thoroughly dry. Defective areas shall be chipped away to remove all loose and partially bonded aggregate. The area shall be thoroughly wetted and filled with as dry as practical mortar mix placed to slightly overfill the recess. Mortar shall include a bonding agent. After partial set has

taken place, the excess mortar shall be removed flush with the surface on the concrete using a wood float. All patching shall be cured, protected, and covered as specified for concrete. All cracks, leaks, or moist spots that appear shall be repaired. No extra compensation will be allowed CONTRACTOR for such work.

2. The exterior or removal portion of nonremovable ties shall be removed with the use of a special tool designed for this purpose. Cutting or chipping of concrete to permit removal of exterior portion will not be permitted.
 3. For nonremovable ties, tie rod holes left by the removal of the exterior portion of the tie and cone shall be thoroughly wetted and filled by ramming with as dry as practical mortar mix in such a manner such that it completely fills the hole. Mortar shall include a bonding agent. All patching shall be cured, protected, and covered as specified for concrete. The holes are to be filled immediately after removal of the exterior portion of the tie.
 4. Holes left by removable ties shall be filled by installing a neoprene plug near the center of the wall. The balance of the hole shall be filled with mortar as specified above to within 1 inch of the face of the wall. The remainder of the hole shall be filled with a waterproofing compound.
 5. All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown or prescribed by ENGINEER. All surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness. All sharp angles, where required, shall be rounded or beveled. Any formed surface to be painted shall be free of any material that will be detrimental to the paint. The surface of the concrete shall be given one of the following finishes immediately after form stripping:
 - a. Finish A shall be referred to as a sack finish. Surfaces shall be free of contaminants prior to sacking. After wetting the surface, a grout shall be rubbed in using a rubber float or burlap. After the grout hardens sufficiently, it shall be scraped from the surface with the edge of a steel trowel without disturbing the grout in the air holes. After further drying, the surface shall be rubbed with burlap to remove all surface grout. The entire surface shall be finished to secure a continuous, hard, dust-free uniform texture surface free from pinholes and other minor imperfections. Finish A will be required for all unpainted surfaces (See Section 09 91 00–Painting for painted surfaces), interior surfaces of equipment rooms, operation areas, and permanently exposed vertical surfaces. Where steel-faced forms are used to form walls, the portion of wall to receive the sack finish shall first be roughened by brush blasting or other acceptable method to achieve a texture similar to 40 to 60 grit sandpaper.
 - b. Finish B shall be the same as Finish A, except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup from the surface. Finish B shall be provided for waterproof- and moistureproof-coated surfaces.
 - c. Finish C shall be referred to as a finish that has surface imperfections less than 3/8 inch in any dimension. Surface imperfections greater than 3/8 inch shall be repaired or removed and the affected areas neatly patched. Finish C or smoother shall be provided for interior surfaces of wet wells, tanks, and channels from 1 foot below minimum water surfaces and down and otherwise unfinished interior surfaces.
 - d. Finish D shall be the finish for surfaces that may be left as they come from the forms, except that tie holes shall be plugged and defects greater than 1/2 inch in any dimension shall be repaired. Finish D shall be provided for surfaces to be buried or covered by other construction such as masonry veneer.
- C. All precautions shall be taken to protect the concrete from stains or abrasions, and any such damage shall be removed or repaired under this Contract.

3.11 LOADING OF CONCRETE STRUCTURES

- A. No concrete structure or portion thereof shall be loaded with its design load until the concrete has obtained its specified 28-day compressive strength. This shall include but not be limited to vertical live load, equipment loading, water loading, groundwater loading, and backfill load. Concrete strength at time of loading shall be determined by testing field-cured concrete cylinders.
- B. Extreme care shall be taken so that construction loads do not exceed design loading of the structure.

3.12 NONSHRINK GROUT

- A. Nonshrink, nonmetallic grout shall be used for filling recesses and pockets left for equipment installation and for setting of base plates. The material used shall be approved by ENGINEER. Store, mix, and place the nonshrinking compound as recommended by the manufacturer. The minimum compressive strength shall be 5,000 psi at age 7 days and 7,500 psi at age 28 days.

3.13 TESTING AND SAMPLING

- A. The following tests of fresh concrete shall be performed by the SPECIAL INSPECTOR. The SPECIAL INSPECTOR shall prepare, protect, transport, and have tested all cylinders at its expense.
 - 1. Sampling of concrete for slump tests, air tests, temperature tests, and for making concrete test cylinders shall be performed in accordance with ASTM C172.
 - 2. Cylinders:
 - a. Three test cylinders shall be made for each pour less than 25 cubic yards, four test cylinders shall be made for each pour between 25 and 100 cubic yards, and eight test cylinders shall be made for each pour in excess of 100 cubic yards. Each concrete mix shall be represented by at least four cylinders for the entire job. Concrete for cylinders shall be collected near the middle of the load and/or as requested by ENGINEER.
 - b. Cylinders shall be made and tested in accordance with ASTM C31 and ASTM C39, respectively. The cylinders must be kept moist and at temperatures between 60°F and 80°F and shall remain undisturbed and stored in a location free from vibration. In hot weather, the cylinders shall be covered with wet burlap and stored in a shaded area. It is CONTRACTOR's responsibility to provide a suitable protected location for storing cylinders on the jobsite.
 - c. After 24 hours, the cylinders shall be transferred to an independent testing laboratory acceptable to OWNER. The cylinders shall be packed in sawdust or other cushioning material for transit to avoid any bumping or jarring of the cylinders.
 - d. Cylinders shall be broken at 7 and 28 days or as requested by ENGINEER. Test results shall be transmitted immediately and directly to ENGINEER and OWNER. Test data shall include date and location of pour and concrete mix used.
 - 3. Slump Test: The SPECIAL INSPECTOR shall make one slump test near the beginning of all pours with two tests being made for all pours in excess of 25 yards or as requested by ENGINEER. Slump tests shall conform to ASTM C143.
 - 4. Air Test:
 - a. When air-entrained concrete is used, the air content shall be checked by Special Inspector near the beginning of all pours with at least two checks being made for all pours in excess of 25 cubic yards, or as requested by ENGINEER.

- b. The air contents shall be checked using the pressure method in accordance with ASTM C231. The pocket-sized alcohol air indicator shall not be used unless it is first used in conjunction with the pressure method test.
- B. All costs of additional testing and sampling of fresh or hardened concrete needed because of suspected or actual violation of the specifications shall be borne by CONTRACTOR.

3.14 RECORDS

- A. A record is to be kept of all concrete work. The record shall include the date, location of pour, concrete mix, slump, air content, test cylinder identification, concrete temperature, and ambient air temperature. In addition, for cold weather concreting the record shall include the daily maximum-minimum thermometer readings of all thermometers during the entire curing period for all concrete pours. The Resident Project Representative will keep this record, and CONTRACTOR shall assist in obtaining needed information.

3.15 CONCRETE REMOVAL AND PATCHING

- A. All areas disturbed as a result of concrete removal or repair shall be patched as specified in Bonding to Existing Concrete.

3.16 CURING AND SEALING INTERIOR BUILDING FLOORS

- A. Install cure-seal hardener product in accordance with manufacturer's instructions. Apply only to those floors noted to be sealed in the finish schedule.
- B. Where product will be used for moist curing, sealing and hardening, apply to new concrete as soon as the concrete is firm enough to walk on after troweling. Where product will be used for sealing and hardening only, surface must be free of dust, dirt, laitance, curing compounds, and any material that would inhibit the penetration of the product. In some instances, the floor may need to be stripped and neutralized before application.
- C. Spray on at rate of 200 square feet per gallon.
- D. Keep surfaces wet with cure-seal hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather, slipperiness may appear before the 30-minute time period has elapsed. If that occurs, apply more cure-seal hardener as required to keep entire surface in a nonslippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a nonslippery state.
- E. After this period, when treated surface becomes slippery, lightly mist with water until slipperiness disappears.
- F. Wait for surface to become slippery again and then flush entire surface with water removing all residue of cure-seal hardener.
- G. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
- H. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.

- I. Protect installed floors until chemical reaction process is complete; at least 3 months.
- J. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
- K. Protection and cleaning of floors are the responsibility of CONTRACTOR until final completion. Replace concrete that becomes stained because of improper precautions or lack of cleaning.

END OF SECTION

SECTION 03 41 13

PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Precast Concrete Hollow Core Planks.
 - 2. Connection Plates and Hangers.
 - 3. Grouting Plank Joint Keys.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ACI 318-Building Code Requirements for Reinforced Concrete.
- B. ASTM C150-Portland Cement.
- C. AWS D1.1-Structural Welding Code.
- D. AWS D1.4-Structural Welding Code-Reinforcing Steel.
- E. PCI-Manual For The Design of Hollow Core Slabs.
- F. PCI MNL-116—Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
- G. PCI MNL-120—Design Handbook—Precast and Prestressed Concrete.
- H. PCI MNL-123—Manual on Design of Connections for Precast Prestressed Concrete.
- I. PCI-Design Handbook-Precast and Prestressed Concrete.
- J. PCI-Tolerances for Precast and Prestressed Concrete.

1.03 DESIGN REQUIREMENTS

- A. Size components to withstand design loads in an unrestrained condition as follows: For Roof Assembly, all dead loads plus live loads plus concentrated loads shown on the Drawings. Increased loading due to snow drifting at obstructions and changes in roof elevation shall be included in the design.
- B. Plank shall be designed in accordance with the PCI-Manual For The Design of Hollow Core Slabs and PCI-Design Handbook.

- C. Plank shall be capable of resisting shear forces as a diaphragm. Diaphragm chords will be the masonry bond beams.

1.04 SUBMITTALS

- A. Professional Engineer: All plank designs shall bear the name and seal of a State of Illinois licensed structural engineer. CONTRACTOR shall be responsible for submitting the required additional copies of plank drawings with original stamp and signature for submittal to the State of Illinois. These materials must be submitted prior to installation.
- B. Shop Drawings: Indicate plank locations, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, and relationship to adjacent materials.
- C. Product Data: Indicate standard component configuration, design loads, deflections, and cambers.

1.05 QUALIFICATIONS

- A. Fabricator: Company specializing in manufacturing the work of this section with 3 years experience. Maintain plant records and quality control program during production of precast planks. Make records available upon request.
- B. Erector: Company specializing in erecting the work of this Section approved by fabricator.
- C. Design precast concrete members in accordance with PCI Manual For The Design of Hollow Core Slabs under direct supervision of a structural engineer experienced in design of this work and licensed in the State of Illinois.
- D. Welder: Qualified within previous 12 months in accordance with AWS D1.1.

1.06 REGULATORY REQUIREMENTS

- A. Conform to ACI 318 and the 2021 International Building Code for design load and on-site construction requirements.
- B. CONTRACTOR shall submit additional copies of shop drawings for submittal to the Code Official by ENGINEER.

1.07 PREINSTALLATION CONFERENCE

- A. Convene minimum one week prior to commencing work of this section under provisions of Section 01 31 00—Coordination, Field Engineering, and Meetings.
- B. Discuss anchor and weld plate locations, sleeve locations, and cautions regarding cutting or core drilling.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Lifting or handling devices shall be capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

- B. Mark each member with date of production and final position in structure.

1.09 COORDINATION

- A. Coordinate the work of framing components not post tensioned but directly associated with the work of this section.
- B. Coordinate field cut openings with affected section.
- C. Coordinate location of hanger tabs and devices for mechanical and electrical work.
- D. Coordinate location of anchors to be placed in masonry walls.

PART 2-PRODUCTS

2.01 FABRICATORS

- A. The plank shall be prestressed hollow-core precast concrete plank as fabricated by the Wells Company, Flexicore Company, or equal.

2.02 MATERIALS

- A. Materials shall comply with provisions of ACI 318.
- B. Cement grout for grouting joints shall be one part Portland Cement per ASTM C150, three parts sand and water.

2.03 ACCESSORIES

- A. Connecting and supporting devices shall be painted A36 steel unless noted otherwise.
- B. Bearing pads shall be high-density plastic, 1/8 inch thick.
- C. Caulk as approved by plank manufacturer.

2.04 FABRICATION

- A. Conform to AWS D1.4., PCI MNL-116, and PCI MNL-120, and PCI MNL-123.
- B. Embed anchors, inserts, plates, angles, and other items at locations indicated.
- C. Cut exposed ends flush.

2.05 FINISHES

- A. Plank to be painted shall be field abrasive blasted and painted as specified in Section 09 91 00-Painting.

- B. Connecting and supporting steel devices shall be prime painted per Section 09 91 00–Painting. Do not paint surfaces in contact with concrete or surfaces requiring field welding.

2.06 FABRICATION TOLERANCES

- A. Conform to PCI-Tolerances for Precast and Prestressed Concrete.

PART 3–EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions and supporting structure are ready to receive work and field measurements are as indicated on shop drawings.

3.02 PREPARATION

- A. Prepare support devices for the erection procedure and temporary bracing.

3.03 ERECTION

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and end joints as erection progresses.
- C. Maintain temporary bracing in place until final connection is made. Protect members from staining.
- D. Install bearing pads at bearing ends of planks as indicated.
- E. Adjust differential camber between precast members to tolerance before final attachment and grouting.
- F. Adjust differential elevation between precast members to tolerance before final attachment.
- G. Grout plank joints, trowel smooth. Any grout that may have seeped through to the ceiling below shall be removed before it hardens. Grout shall also be placed between masonry and underside of roof plank in spaces created by roof plank camber over all exterior walls and bearing walls. On nonbearing interior walls, a void over 1/2 inch shall be filled with 1/2-inch expansion material and grout the remainder. This grout shall be applied following roofing. It is the intent that a space of 1/4 inch to 1/2 inch be left for caulking as required in Section 07 90 00–Caulking and Sealants.
- H. Underside of joints between planks that remain exposed shall be caulked as required in Section 07 90 00–Caulking and Sealants.
- I. Where open cores at end of planks are to remain exposed to view. The cores shall be grouted full for a minimum 6-inch depth to provide finished end of plank.

- J. Secure units in place. Perform welding, where shown, in accordance with AWS D1.1.

3.04 ERECTION TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-116.

3.05 CUTTING OPENINGS

- A. Cooperation shall be extended to all trades in permitting the insertion of anchors, hangers, vents, electrical outlets, etc. Holes needed for such devices shall be cut in the field by the various trades. Cuts shall be made with a masonry saw or core drill. The various trades shall be present during installation of the roof deck. All openings not dimensioned or shown on the Drawings shall be located by the trades requiring the openings. All openings larger than 8 inches in any dimension shall be made by the roof slab supplier, and where necessary, hangers shall be furnished by the supplier. All spalling shall be repaired by the roof plank supplier prior to caulking. It is essential that plank which will remain exposed from below have a neat finished surface. Particular care shall be given to appearance of holes and openings.

END OF SECTION

SECTION 04 05 13
MORTAR AND MASONRY GROUT

PART 1–GENERAL

1.01 SUMMARY

- A. The work includes mortar and grout for masonry.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. 2021 International Building Code.
- B. ASTM C91–Masonry Cement.
- C. ASTM C144–Aggregate for Masonry Mortar.
- D. ASTM C150–Portland Cement.
- E. ASTM C207–Hydrated Lime for Masonry Purposes.
- F. ASTM C404–Aggregates for Masonry Grout.
- G. ASTM C476–Grout for Masonry
- H. ASTM C979–Pigments for Integrally Colored Mortar/Concrete.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00–Submittals.
- B. Submit information on Portland cement, integral waterproofing compound, and hydrated lime for mortar. Include design mix with proportions of materials being used. Submit gradation on aggregates.
- C. Submit design mix for grout including gradation of aggregates.
- D. Manufacturer's certificate: Certify that products meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. All cement shall be stored in a dry, weatherproof, properly ventilated structure which will protect it from dampness and freezing.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. See Section 04 20 00–Unit Masonry System, for cold weather requirements.

PART 2–PRODUCTS

2.01 MORTAR

- A. Provide Portland cement-lime mortar or masonry cement mortar with proportion restrictions as stated in the 2021 International Building Code. Provide integral waterproofing compound in mortar for all exterior masonry. Provide Type N mortar for exterior non-load bearing brick and split face block veneer. Provide Type S mortar for all other masonry.
- B. Portland cement shall conform to ASTM C150, Type I or III ; or ASTM C595 Type IL.
- C. Hydrated lime shall conform to ASTM C207, Type S.
- D. Masonry cement shall conform to ASTM C91.
- E. Integral waterproofing compound shall be Dry-Block by W.R. Grace Company, or equal.
- F. Mortar aggregate for ordinary tile, brick, stone, and block shall consist of clean, sharp sand, conforming to ASTM C144. The sand shall be graded within the following limits:

Sieve Number	Percent by Weight Passing
4	100
8	95 to 100
16	70 to 100
30	40 to 75
50	10 to 35
100	2 to 15
200	---

- G. Sand from any one source shall not vary over the extreme limits shown above. For unusually thin joints, such as occur with a unit having cut or ground edges, the aggregate used shall conform to these specifications except that 95% shall pass a No. 16 sieve.
- H. Water used in mixing water shall be clean and free of injurious materials.
- I. Mortar shall be thoroughly mixed until of uniform color and consistency. Only sufficient mortar to meet the immediate requirements of the work shall be mixed at one time. No mortar shall be retempered after it has begun to set, and no partially set mortar shall be used. No antifreeze material shall be used in the mortar to lower the freezing point.

2.02 GROUT

- A. Grout shall conform to ASTM C476–Mortar and Grout for Reinforced Masonry.

- B. Aggregates shall conform to ASTM C404--Aggregates for Masonry Grout.
- C. Grout shall have a minimum 28-day compressive strength of 2,500 psi with the following proportions:
 - 1. Fine Grout: 1 Portland Cement: 0 to 1/10 lime: 2 1/2 to 3 fine aggregate.
 - 2. Coarse Grout: 1 Portland Cement: 0 to 1/10 lime: 2 1/2 to 3 fine aggregate: 1 to 2 coarse aggregate.
- D. Fine grout shall be used in spaces with least horizontal dimension greater than 3/4 inch and less than 2 1/2 inches. Coarse grout shall be used in all spaces with least dimensions 2 1/2 inches or greater.

PART 3--EXECUTION

3.01 INSTALLATION

- A. Brace masonry for wet grout pressure.
- B. Work grout into masonry cores and cavities.
- C. Where joints occur in grout, they shall be made 2 inches below the block joint so that a key is provided.
- D. Grout full masonry walls from top of floor to underside of all lintels at openings for a distance of 16 inches adjacent to each side of opening, unless shown otherwise on the Drawings.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY SYSTEM

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Concrete Block.
 - 2. Brick.
 - 3. Stone Veneer.
 - 4. Smooth-Face Block.
 - 5. Reinforcement, Anchorage, Control Joints, and Accessories.
 - 6. Cold Weather Requirements.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00—Submittals.
- B. Provide complete shop drawings of all materials to be furnished and installed under this section.

1.03 REFERENCES

- A. 2021 International Building Code.
- B. ASTM C67—Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- C. ASTM C90—Standard Specification for Loadbearing Concrete Masonry Units.
- D. ASTM C216—Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
- E. UL—Fire Resistance Directory.

1.04 QUALITY ASSURANCE

- A. Variation from the plumb in the lines and surfaces of columns and walls shall not exceed 1/4 inch in 10 feet, 3/8 inch in a story height or 20 feet maximum or 1/2 inch in 40 feet or more. Variation from plumb for external corners, expansion joints, and other conspicuous lines shall not exceed 1/4 inch in any story or 20 feet maximum or 1/2 inch in 40 feet or more.
- B. Variation from the level of the grades indicated on the drawing for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines shall not exceed 1/4 inch in any bay or 20 feet or 1/2 inch in 40 feet or more.

- C. Variation of the linear building line from an established position in plan and related portion of columns, walls, and partitions shall not exceed 1/2 inch in any bar or 20 feet maximum or 3/4 inch in 40 feet or more.
- D. Variation in cross-sectional dimensions of columns and thickness of walls shall not exceed minus 1/4 inch or plus 1/2 inch from the dimensions indicated on the drawings.

1.05 MOCKUP

- A. Provide a 4-foot by 4-foot mockup panel of masonry, including anchor accessories and flashings, before any masonry work begins. Location will be indicated by OWNER. Mockup panel shall be approved by OWNER and used as a sample of the quality of work to be expected on the job. Mockup panel may not remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Masonry units, when delivered to the site, shall be thoroughly cured and shall be dry. When stored on the site, they shall not be in contact with the ground, shall be kept clean and covered.

1.07 COLD WEATHER REQUIREMENTS

- A. All masonry units delivered to use in freezing weather shall be fully protected by a weathertight covering to prevent accumulation of ice on the units. Loose board covering will not be permitted.
- B. Cold Weather Protection:
 - 1. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
 - 2. Remove all masonry determined to be frozen or damaged by freezing conditions.
 - 3. Perform the following construction procedure while the work is progressing. When air temperature is from 40°F (4°C) to 32°F (0°C), heat sand or mixing water to produce mortar temperature between 40°F (4°C) and 120°F (49°C):
 - a. When air temperature is from 32°F (0°C) to 25°F (-4°C), heat sand or water to produce mortar temperature between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.
 - b. When air temperature is from 25°F (-4°C) to 20°F (-7°C), heat sand and mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing; use salamanders or other heat sources on both sides of walls under construction; use wind breaks when wind is in excess of 15 mph.
 - c. When air temperature is from 20°F (-7°C) and below, heat sand and mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); provide enclosures and auxiliary heat to maintain air temperature above 32°F (0°C); do not lay units which have a surface temperature of 20°F (-7°C).
 - 4. Perform the following protections for completed masonry and masonry not being worked on:
 - a. When the mean daily air temperature is from 40°F (4°C) to 32°F (0°C), protect masonry from rain or snow for at least 24 hours by covering with weather-restrictive membrane.

- b. When the mean daily air temperature is from 32°F (0°C) to 25°F (-4°C), completely cover masonry with weather-restrictive membrane for at least 24 hours.
- c. When the mean daily air temperature is from 25°F (-4°C) to 20°F (-7°C), completely cover masonry with insulating blankets or similar protection for at least 24 hours. Extend time period to 48 hours for grouted masonry.
- d. When mean daily temperature is 20°F (-7°C) and below, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures, blankets, and supplementary heat. Extend time period to 48 hours for grouted masonry.

PART 2-PRODUCTS

2.01 CONCRETE BLOCK

- A. Concrete block shall be load bearing and shall conform to the requirements of ASTM C90 and the 2021 International Building Code. Bond shall be running bond. Concrete block shall be the two-cell type and shall be made with normal weight aggregate.
- B. Concrete block shall have a minimum net area compressive strength f'_{cmu} of 3,250 psi.
- C. Unless otherwise indicated, interior concrete block at window sills and lintels, pilasters, and the top course of walls at roof lines shall be constructed of solid concrete block, lintel block filled with grout, or the cores of the block filled with grout. Interior block at window sills shall be solid concrete block unless otherwise noted. Bullnose block shall be used at all door, window, and wall corners that remain exposed.
- D. All interior concrete block walls shall extend to the underside of roof deck or floor above unless noted otherwise.
- E. Provide sash units with integral dovetail slots at masonry control joints.

2.02 BRICK

- A. Face brick shall be ASTM C216, latest edition, Grade SW, Type FBS, made from clay, shale, fine clay, or mixture thereof. All brick shall be free from cracks, laminations, and other defects that may interfere with proper laying of brick or impair the strength or permanence of the structure.
- B. Acceptable products for each brick face color shall be the following, or equal:
 - 1. Face Color 1, as shown on Drawings: Morning Dove by Glen-Gery.
 - 2. Face Color 2, as shown on Drawings: Charcoal Gray Velour by Glen-Gery.
- C. A certificate of conformance as to grade and type shall be supplied by the manufacturer.
- D. CONTRACTOR shall submit brick samples to ENGINEER for selection. The bricks to be used shall be of modular size (7 5/8 by 2 1/4 by 3 5/8) and running bond.
- E. Provide all brick masonry to complete work.

2.03 STONE VENEER

- A. Stone veneer shall be Old Ontario Grey Ledge stone by NG Stone.

2.04 DECORATIVE CONCRETE BLOCK

- A. Smooth Face Block:
 - 1. Smooth face units shall be used where shown on the Drawings. Nominal face size of units shall be 8 inches by 16 inches. Nominal thickness shall be as shown on the Drawings.
 - 2. The block shall be made with an integral coloring compound and an integral waterproofing compound. The block shall be made with normal weight aggregate and shall meet ASTM C33 and ASTM C90.
 - 3. The integral waterproofing compound shall be DRY-BLOCK SYSTEM, Block Admixture as manufactured by W.R. Grace & Co., Cambridge, MA, or equal. The admixture manufacturer shall determine the amount of compound to be used. The admixture used in the block shall be of the same manufacture as used in the mortar.
 - 4. Block colors shall be selected by OWNER.

2.05 REINFORCEMENT AND ANCHORAGE

- A. For concrete block walls, masonry wall reinforcement shall be 220 Ladder-Mesh manufactured by Hohmann & Barnard, Inc., Ladder Wire, manufactured by Wire-Bond, or equal.
- B. For cavity walls, masonry wall reinforcement shall be 270-2X Ladder Eye-Wire as manufactured by Hohmann & Barnard, Inc., Ladder Adjustable Tab by Wire-Bond, or equal.
- C. Wall reinforcement and ties shall be hot-dipped galvanized having a minimum 1.50 ounce/square foot zinc coating in accordance with ASTM A153 Class B2.
- D. Side rods shall be 9 gauge wire, and cross rods and tabs shall be 9 gauge wire. Maximum spacing of tabs shall be 24 inches.
- E. Prefabricated corner and tee sections shall be used to form continuous reinforcement around corners and for anchoring abutting walls and partitions.
- F. Masonry Ties to Stud Walls: Ties shall be 2-Seal as manufactured by Hohmann & Barnard, Inc., SureTie WS by Wire-Bond, or equal, with one tie per 2 square feet of wall area.
- G. Reinforcing Bar Positioners: Where vertical reinforcing bars are required, provide bar positioners by Hohmann and Barnard, or equal.

2.06 ACCESSORIES

- A. Cellular or honeycomb cell vents, 2 1/2 inches high, shall be provided at weep holes. Cell vents shall be UV-resistant polypropylene, QV-Quadro-Vent, or equal.
- B. Vertical expansion control joints shall be located as shown on the drawings. Control joints shall be constructed with a factory-extruded section of rubber equal to RS Series—Rubber Control Joint by Hohmann & Barnard, Inc., Rubber Control Joint by Wire-Bond, or equal,

and shall extend for the entire height of the wall. Care shall be taken so that the gap is free of mortar or debris. Control joint shall be caulked on exposed faces with caulk of a color to match mortar.

- C. See Section 05 50 00–Metal Fabrications for masonry veneer support loose lintels.
- D. See Section 07 26 00–Vapor and Air Barrier for air barrier on masonry walls.
- E. See Section 07 62 00–Flashing and Sheet Metal for masonry flashing specifications.

PART 3–EXECUTION

3.01 MASONRY WORKMANSHIP

- A. All masonry shall be laid plumb and true to lines. Brick shall be laid with complete full mortar joints. Mortar beds shall be spread smooth or only slightly furrowed. The ends of brick shall be buttered with sufficient mortar to fill the end joint.
- B. All masonry shall be laid in running bond, unless specified otherwise.
- C. Avoid over-plumbing and pounding of the corners and jambs to fit stretcher units after being set in position. Where an adjustment must be made after the mortar has started to harden, the mortar shall be removed and replaced with fresh mortar.
- D. In building cavity walls, the cavity shall be kept clean by slightly beveling the mortar bed to incline toward the cavity or by placing wood strips with attached wire pulls on the metal ties. The strips shall be withdrawn and cleaned before placing the next row of metal ties. Any mortar fins that protrude into the cavity space as the wall is built shall be troweled flat onto the inner face of the wythe.
- E. Where cutting of exposed masonry is necessary, the cuts shall be made with a motor-driven masonry saw or by other methods that provide cuts that are straight and true.
- F. Where flashing is to be laid on or against masonry, the surface of the masonry shall be smooth and free from projections that might puncture the flashing material. Through-wall flashing shall be placed on a bed of mortar, and mortar shall be placed above the flashing.
- G. Weep holes spaced 32 inches on center 2 1/2 inches high shall be provided in the first course immediately above all flashing and at the uppermost course immediately below soffits or coping. Weep holes shall be kept free of mortar droppings.
- H. Outside joints around the perimeter of exterior door and window frames or other wall openings shall be not less than 1/4 inch nor more than 3/8 inch wide and shall be cleaned out to a uniform depth of at least 3/4 inch ready for placement of caulk.
- I. All walls shall be adequately braced until they are completed and anchored to the roof construction.
- J. All brick having initial rates of absorption in excess of 0.25 ounce per square inch per minute shall be wetted sufficiently so that the rate of absorption when laid does not exceed this

amount. Wetting of units shall be such so that each unit is nearly saturated, surface dry when laid. During freezing weather, units that require wetting shall be sprinkled with warm water just before laying.

3.02 MORTAR JOINTS

- A. All joints shall be laid plumb to lines. Unless specified otherwise, mortar beds shall be full 3/8 inch thick and shall be spread smooth or only slightly furrowed. Vertical joints shall be shoved not over 3/8 inch thick, unless otherwise shown. All joints shall be completely filled.
- B. Interior and exterior joints shall be tooled concave. All joints shall be tooled to uniform depth and shall be straight and true. Mortar joints shall be cut flush with masonry where rigid thermal insulation will be applied to interior masonry surfaces.

3.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcement shall be installed in the first and second bed joint 8 inches apart immediately above lintels and below sills at openings. Elsewhere, spacing shall be at 16-inch vertical intervals or as shown on the drawings. Extend reinforcement in the second joint above and below openings 2 feet beyond the jambs. All other reinforcing shall be continuous.
- B. Side rods shall be lapped 6 inches minimum at splices. Reinforcement units shall be of widths required for wall thicknesses as shown. Reinforcement shall be placed to allow for a 5/8-inch mortar cover on the exterior face of walls and 1/2-inch mortar cover on interior faces.
- C. Vertical reinforcing bars shall be installed using prefabricated bar positioners. Provide one positioner at the top of the first course of block and one additional positioner at a maximum spacing of 200 bar diameters.

3.04 BUILT-IN WORK

- A. As work progresses, install all built-in work (such as window and door frames, anchor bolts, plates, and lintels) to be provided by other sections.
- B. Install built-in items plumb and level.
- C. Bed anchors of metal door frames in adjacent mortar joints. Grout all steel door frames full with mortar except those called for to be "removable."
- D. Do not use built-in organic materials subject to deterioration.
- E. Steel members embedded in exterior masonry shall be "battered" with not less than 1/2 inch of setting mortar on all surfaces.

3.05 JOINING OF WORK

- A. Where fresh masonry joins masonry that is partially set or totally set, the exposed surface of the set masonry shall be cleaned and lightly wetted so as to obtain the best possible bond with the new work. All loose brick and mortar shall be removed. If it becomes necessary to "stop-off" a horizontal run of masonry, this shall be done only by racking back brick in each

course, and if grout is used, stopping grout 4 inches back of the rack. Toothing will not be permitted.

3.06 PROTECTION OF WORK

- A. During erection, all walls shall be kept dry by covering at the end of each day or shutdown period with a canvas or waterproof covering. Partially completed walls not being worked on shall be similarly protected at all times. All covering shall overhang at least 2 feet on each side of the wall and shall be securely anchored.

3.07 MASONRY CONTROL JOINTS

- A. Provide vertical masonry control joints as detailed on the drawings.
- B. Where possible, joints shall be located at one or both edges of door, window, and louver openings and at changes in wall height.

3.08 CLEANING NEW WORK

- A. Masonry faces to remain exposed shall be wiped with a damp cloth as the work progresses and thoroughly cleaned and pointed upon completion. If stiff brushes and water will not suffice, the surface shall be thoroughly wetted with plain water and then scrubbed with a 5% or 10% solution of hydrochloric acid. Alternatively, a commercial cleaner such as Sure Klean, or equal, may be used. Immediately after, the surface shall be washed to remove all traces of acid. All surfaces not being cleaned shall be protected from the acid. All mortar shall be removed from surfaces other than masonry.

END OF SECTION

SECTION 04 72 00

CAST STONE

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes cast stone bands and sills.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A184—Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- B. ASTM A615—Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. ASTM A1064—Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- D. ASTM C33—Concrete Aggregates.
- E. ASTM C150—Portland Cement.
- F. ASTM C260—Air-Entraining Admixtures for Concrete.
- G. ASTM C494—Chemical Admixtures for Concrete.
- H. ASTM C979—Pigments for Integrally Colored Concrete.

1.03 DESCRIPTION

- A. Cast stone is a building material manufactured from carefully controlled portions of Portland Cement and coarse and fine aggregates molded into shapes by the manufacturer.

1.04 DESIGN REQUIREMENTS

- A. Units shall be designed to withstand dead and live loads, applicable snow load, erection forces, and other loads in accordance with the 2021 International Building Code.

1.05 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop drawings shall indicate layout, configuration, dimensions, joint locations, identification marks, reinforcement, connection details, openings, lifting devices, and relationship to adjacent materials.

- C. Submit sample of each type of unit illustrating surface finish, color, and texture.

1.06 QUALITY ASSURANCE

- A. Manufacturer shall have minimum 5 years of continuous successful experience in fabricating cast stone materials in compliance with Cast Stone Institute standards.
- B. Installer shall have minimum 5 years successful experience in handling and installing cast stone units on projects of comparable size and scope.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Provide protective coverings and temporary lateral support to prevent damage during shipping. Blocking and supports shall be clean, nonstaining, and shall not cause harm to exposed surfaces.
- B. Store stone units under cover, off the ground, away from areas subject to high humidity conditions.
- C. Where extended on-site storage is necessary, provide nonstaining wood cribbing between stacked units to promote air circulation and prevent condensation.

PART 2-PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Cast stone members shall be as manufactured by Edwards Cast Stone Company, Dubuque, Iowa, or equal.

2.02 MATERIALS

- A. Cement: ASTM C150, Portland, Type 1 or III, grey.
- B. Fine Aggregate: ASTM C33, graded and washed natural sand; gradation required to attain indicated texture and finish.
- C. Coarse Aggregate: ASTM C33, graded and washed natural gravel, gradation required to attain indicated texture and finish.
- D. Color Pigments: ASTM C979, inorganic iron oxide pigments, limeproof. Cement grade carbon black pigment is not acceptable.
- E. Reinforcing: ASTM A615, Grade 60, galvanized where embedment is less than 2 inches for No. 5 bars or greater; 1 1/2 inches for No. 4 bars or smaller.
- F. Steel Wire Reinforcement: ASTM A1064.
- G. Welded Wire Fabric: Comply with ASTM A1064, where applicable.
- H. Steel Bar or Rod Mat Reinforcement: Comply with ASTM A184, where applicable.

- I. Admixtures: Comply with ASTM C494.
- J. Water: Potable, free of impurities.
- K. Air Entrainment: Comply with ASTM C260. Wet-cast mixtures shall contain between 5 to 7% air entrainment where surfaces are exposed to freeze-thaw conditions.
- L. Mortar shall be as specified in Section 04 05 13–Mortar and Masonry Grout.

2.03 SUPPORT DEVICES

- A. Connecting and supporting devices shall be Type 304 or 316 stainless steel.
- B. Bolts, nuts, and washers shall be Type 304 stainless steel.
- C. Provide cramp anchors for anchoring stones together at corners.
- D. Setting buttons, shims, and sheet shall be lead or resilient plastic, nonstaining, thickness to suit joint thickness. For pointed joints, sized to avoid interference with pointing operation.

2.04 ACCESSORIES

- A. Sealant shall be type specified in Section 07 90 00–Caulking and Sealants.

2.05 FABRICATION

- A. Factory fabrication shall comply with Cast Stone Institute recommended fabricating practices.
- B. Comply with Cast Stone Institute recommended tolerances and the following:
 - 1. Height and Width: Plus 1/16 inch; minus 1/8 inch.
 - 2. Lengths:
 - a. Up to 2 feet 0 inch: Plus 1/16 inch; minus 1/8 inch.
 - b. From 2 feet 0 inch to 5 feet 0 inch: Plus or minus 1/8 inch.
 - c. From 5 feet 0 inch to 10 feet 0 inch: Plus 1/8 inch; minus 3/16 inch.
- C. Color and texture shall match approved samples, when viewed in direct daylight at a 20-foot distance.
- D. Cast stone manufacturer is responsible for preparing design mix to attain compressive strength of 6,500 psi at 28 days.
- E. Water absorption shall be maximum 6% by dry weight.
- F. Reinforcing shall be placed according to Cast Stone Institute recommendations for safe handling, settling, and structural requirements and as indicated on approved shop drawings.
- G. After manufacturing, cure all dry-tamped cast stone minimum of 8 hours in a totally enclosed curing room at 85°F and 100% relative humidity; then steam cure for minimum 10 hours.

- H. For new design mixes, take daily test cylinders and test in-house using a certified technician, at 20 hours and 28 days after manufacture to provide compliance with minimum compressive strength requirements. Cast stone manufacturer will not be required to retest previous tested and used standard design mixes.
- I. Maintain consistent quality during manufacture.
- J. Exposed-to-view finish surfaces shall be uniform in color and appearance.

PART 3-EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive cast stone work and verify that building structure, anchors, devices, and openings are ready to receive work of this section. Do not proceed with installation until surfaces and conditions meet requirements for acceptable installation.

3.02 PREPARATION

- A. Verify that installation of items required for stonework to be installed by others are proper type, size, finish, and are located at proper spacings with proper anchorage.

3.03 ERECTION

- A. Install/set all units and accessories accurately, using skilled experienced personnel, according to approved shop and setting drawings.
- B. Clean stone surfaces before setting using only water or mild cleaning compounds containing no caustic or abrasives.
- C. Drench all stone units thoroughly with water just before setting.
- D. Provide chases, reveals, openings, and other spaces required to accommodate other work. Close up after other work is complete with cast stone which matches stone already set.
- E. Where an open cavity is indicated between cast stone and backup material, keep cavity free of mortar and grout.
- F. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stonework in place. Attach anchors securely to stone and to supporting surfaces. Place anchors and dowels firmly, and fill holes with mortar or nonshrink grout.
- G. Set cast stone accurately, in patterns and locations indicated, with uniform joints of dimensions indicated and with edges and faces aligned according to established relationships and indicated tolerances.
- H. Set stones supported on solid structural members on setting buttons, shims, or sheets, or a combination of setting buttons and mortar.
- I. After setting each stone, sponge off mortar smears and splashes.

- J. Embed only ends of lugged sills and similar stones; leave remainder of joint open and tuckpoint on faces only.
- K. Set all partially or fully horizontal stones with unfilled vertical joints. After setting, install backer rod, prime ends, and caulk.
- L. Setting Tolerances: Set cast stone units to the following tolerances unless detailed otherwise:
 - 1. Variation from plumb of lines and surfaces of columns, walls, and arises: Maximum 1/4 inch in 10 feet.
 - 2. Variation from level of grades indicated for floors, exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines: Maximum 1/2 inch in any 20-foot bay; maximum 3/4 inch in any dimension over 40 feet.
 - 3. Variation of linear building lines from position in plan: Maximum 1/2 inch in any 20-foot bay.
 - 4. Variation in cross-sectional dimensions of column and wall thicknesses: maximum $\pm 1/4$ inch.
 - 5. Variation between faces of adjacent pieces and panels is not permitted.

3.04 FIELD QUALITY CONTROL

- A. Remove and replace work that is broken, chipped, stained, or otherwise damaged; work that does not match approved samples or approved mockup; and work containing defective joints. Replace unacceptable materials in accordance with the cast stone manufacturer, leaving no visible evidence of replacement.

3.05 CLEANING

- A. Perform final cleaning as soon as possible after mortar has set and been tooled. Use no wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods which could damage or cause discoloration or etching of surfaces or joints, without written approval from cast stone manufacturer.

3.06 PROTECTION

- A. Protect work from staining or damage to finished surfaces by ongoing construction until acceptance by OWNER.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Shop-fabricated carbon steel, stainless steel, and aluminum items.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A36—Carbon Structural Steel.
- B. ASTM A53—Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. ASTM A123—Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A143—Practice for Safeguarding Against Embrittlement of Hot-Dipped Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
- E. ASTM A153—Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- F. ASTM A240—Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- G. ASTM A276—Stainless Steel Bars and Shapes.
- H. ASTM A307—Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
- I. ASTM A384—Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- J. ASTM A385—Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- K. ASTM A500—Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- L. ASTM A780—Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- M. ASTM A992—Structural Steel Shapes.
- N. ASTM A1008—Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

- O. ASTM A1011—Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- P. ASTM B209—Aluminum and Aluminum-Alloy Sheet and Plate.
- Q. ASTM B211—Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.
- R. ASTM B221—Aluminum and-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- S. AWS A2.0—Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- T. AWS A5.4—Stainless Steel Electrodes for Shielded Metal Arc Welding.
- U. AWS D1.1—Structural Welding Code—Steel.
- V. AWS D1.2—Structural Welding Code—Aluminum.
- W. AWS D1.6—Structural Welding Code—Stainless Steel.
- X. ASTM F593—Standard Specifications for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- Y. ASTM F594—Standard Specification for Stainless Steel Nuts.

1.03 DESIGN REQUIREMENTS

- A. All fabrications shall meet applicable code requirements including OSHA.

1.04 SUBMITTALS FOR REVIEW

- A. Comply with pertinent provisions of Section 01 33 00—Submittals.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, sections, elevations, and details where applicable.
- C. Mill Test Reports: Submit indicating structural strength and composition.
- D. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Fabricate steel members in accordance with AISC Code of Standard Practice.
- B. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

1.06 QUALIFICATIONS

- A. Qualify welding processes and welding operators in accordance with AWS *Standard Qualifications Procedures*.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to job site properly marked to identify the structure for which it is intended and at such intervals to allow uninterrupted progress of the work. Marking shall correspond to markings indicated on the shop drawings.
- B. Store all members off the ground using pallets, platforms, or other supports.
- C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures.
- D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to OWNER.

PART 2—PRODUCTS

2.01 MATERIALS—CARBON STEEL

- A. Steel Sections:
 - 1. ASTM A36 (channels, angles, plates).
 - 2. ASTM A992 (wide flange sections).
 - 3. Pipe: ASTM A53, Grade B.
 - 4. Tubes: ASTM A500, Grade B.
 - 5. Silicon content of steel members to be hot-dipped galvanized shall be in the range of 0 to 0.04%. Submit mill test reports confirming compliance.
- B. Sheet Steel: ASTM A1011.
- C. Plain Washers: Round carbon steel complying with FS FF-W-92.
- D. Bolts, Threaded Rods, and Nuts: ASTM A307 Grade A, or galvanized to ASTM A153 for galvanized components for exterior use and where built into exterior walls.
- E. Lock Washers: Helical spring-type carbon steel complying with FS FF-W-84.
- F. Welding Electrodes: Comply with AWS D1.1. E70XX electrodes for carbon steel. For ASTM A992 steel and any other steel with 50 ksi or greater yield strength, use only E7018 or other E70XX electrodes specifically permitted by AWS D1.1.
- G. Select fasteners for the type, grade, and class required.

2.02 MATERIALS—STAINLESS STEEL

- A. Unless otherwise noted, all stainless steel bars and shapes shall meet the requirements of ASTM A276 and shall be Type 316L.

- B. Unless otherwise noted, all stainless steel bolts shall meet the requirements of ASTM F593 and shall be Type 316L.
- C. Unless otherwise noted, all stainless steel nuts shall meet the requirements of ASTM F594 and shall be Type 316L.
- D. If components are not available in Type 316L, other 300 Series type shall be used as approved by ENGINEER.
- E. Welding Electrodes:
 - 1. Comply with AWS D1.6.
 - 2. Use ER316L electrodes for 316L stainless steel.
 - 3. Use ER308L electrodes for 304L stainless steel.

2.03 MATERIALS—ALUMINUM

- A. Extruded Aluminum: ASTM B221, Alloy 6061, Temper T6.
- B. Sheet Aluminum: ASTM B209, Alloy 3005.
- C. Aluminum-Alloy Bars: ASTM B211, Alloy 6061, Temper T6.
- D. Bolts, Nuts, and Washers: Stainless steel.
- E. Welding Materials: AWS D1.2; type required for materials being welded.

2.04 ACCESSORIES

- A. Masonry Veneer Support System:
 - 1. For exterior masonry cavity wall construction, provide prefabricated, hot-dip galvanized steel masonry veneer support system to support brick or split face block veneer from concrete masonry backup wall.
 - 2. System shall be Hohmann and Barnard TBS Thermal Brick Support System, Fero Fast Thermal Bracket system, Halfen Brickwork Support System, or equal.
 - 3. When shelf angle size is not indicated on the drawings, shelf angle design shall be provided by manufacturer. Manufacturer's design shall bear the seal of a professional engineer licensed in the state the project is located in.
 - 4. Fasten veneer support system to masonry backup wall using manufacturer standard adjustable brackets and 304 stainless steel masonry anchors. Fastener type and sizing shall be provided by the manufacturer. Manufacturer's fastener design shall bear the seal of a professional engineer licensed in the state the project is located in.
 - 5. Submit product details, shop drawings including overall layout, shelf angle sizes, bracket locations, and connections details, and design calculations bearing the seal of a professional or structural engineer, as appropriate, and licensed in the state the project is located in.
 - 6. Provide soffit concealer system equal to Fero Fast Soffit Concealer to conceal the underside of shelf angles and masonry cavities.
 - 7. In lieu of prefabricated shelf angle support system, CONTRACTOR may provide alternative custom-fabricated shelf angle support system with standoffs fastened to the CMU backup wall and equivalent soffit concealer trim, as detailed on the Drawings.

2.05 FABRICATION

- A. Fabrication and Assembly:
 - 1. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the approved shop drawings.
 - 2. Properly mark and match-mark materials for field assembly and for identification as to structure and site for which intended.
 - 3. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 - 4. Where finishing is required, complete the assembly, including welding of units, before start of finishing operation.
 - 5. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.
- B. Connections:
 - 1. Bolts and washers of all types and sizes shall be provided for completion of all field erection.
 - 2. Comply with AWS Code for procedures, appearance, and quality of welds used in correcting welded work.
 - 3. Assemble and weld built-up sections to produce true alignment of axes without warp.
 - 4. Welding shall be done by the shielded arc process.
 - 5. All welds shall be chipped, ground smooth, and primed immediately after fabrication.
- C. Workmanship:
 - 1. Use materials of size and thickness shown or, if not shown, of size and thickness to produce strength and durability in the finished product.
 - 2. Work to dimensions shown or accepted on the shop drawings using proven details of fabrication and support.
 - 3. Form exposed work true to line and level, with accurate angles and surfaces, and with straight sharp edges.
 - 4. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing works.
 - 5. Cap all open ends of pipe and structural tubing.
 - 6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.
 - 7. Provide for anchorage of the type shown. Coordinate with supporting structures. Fabricate and space the anchoring devices to provide adequate support for intended use.
 - 8. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive hardware and similar items.

2.06 FINISHES

- A. Carbon steel surfaces shall be prepared by abrasive blasting to SSPC-SP10 as specified in Section 09 91 00—Painting.
- B. Do not prime surfaces where galvanizing or field welding is required.

- C. Immediately after surface preparation, prime paint carbon steel items with one coat in accordance with manufacturer's instructions and Section 09 91 00–Painting.
- D. Structural Steel Members: Galvanize after fabrication to the requirements in this section and ASTM A123.
- E. Surfaces that will be inaccessible after assembly or erection shall be finish painted prior to assembly or erection.
- F. Galvanizing:
 - 1. All items, except piping designated to be galvanized, shall be hot-dipped galvanized in accordance with ASTM Specification A123 and A153. Piping shall be hot-dipped galvanized in accordance with ASTM A53. Furnish a Certificate of Compliance stating that the galvanizing complies with ASTM Specifications and Standards and all other applicable requirements specified herein.
 - 2. Fabrication of items to be galvanized shall be in accordance with ASTM A143, A384, and A385. Structural steel shall be fabricated generally in accordance with Class 1 guidelines as shown in *Recommended Details for Galvanized Structures* as published by the American Hot Dip Galvanizer's Association, Inc.
 - 3. Galvanized items shall be handled, transported, and stored to prevent damage or staining to the coating. Maintain adequate ventilation and continuous drainage.
 - 4. Silicon content for steel to be hot-dipped galvanized shall be in the range of 0 to 0.04%.
 - 5. Steel work shall be precleaned utilizing a caustic bath, acid pickle and flux, or shall be blast cleaned and fluxed. In either case, all surface contaminants and coatings shall be removed.
 - 6. All welding shall be performed in accordance with the American Welding Society publication D19.0-72, *Welding Zinc Coated Steel*. All uncoated weld areas shall be touched up.
- G. Aluminum shall have a mill finish unless otherwise specified. Any aluminum in contact with concrete or dissimilar metal shall be coated with multiple coats of bituminous paint, minimum 10 mils dry.

PART 3–EXECUTION

3.01 EXAMINATION

- A. Correct conditions detrimental to the proper and timely completion of the work.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors which are to be embedded in concrete construction.
- B. Coordinate delivery of such items to project.
- C. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

- A. Setting Precast Anchorages:
 - 1. Clean bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
 - 2. After the bearing members have been positioned and plumbed, tighten and anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
 - 3. Pack grout solidly between bearing surfaces and plates so that no voids remain.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- C. Cutting, Fitting, and Placement:
 - 1. Perform cutting, drilling, and fitting for installation of miscellaneous metal fabrications.
 - 2. Set work accurately in location, alignment, and elevation and make plumb, level, true, and free from rack measured from established lines and levels.
 - 3. Fit exposed connections accurately together to form tight hairline joints.
 - 4. Weld connections that are not to be left as exposed joints, grind joints smooth, and touchup shop paint coat or galvanizing repair.

3.04 FIELD WELDING

- A. Comply with AWS Code for procedures of manual shielded metal arc welding (steel, stainless steel) and gas metal arc welding (aluminum), appearance and quality of weld made, and methods in correcting welding work.

3.05 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting in accordance with Section 09 91 00—Painting.

3.06 GALVANIZING REPAIR

- A. Areas damaged by welding, flame-cutting, or during handling, transport, or erection shall be repaired by one of the following methods whenever damage exceeds 3/16 inch in width.
 - 1. Cold Galvanizing Compound:
 - a. Surfaces to be reconditioned with zinc-rich paint shall be clean, dry, and free of oil, grease, and corrosion products.
 - b. Areas to be repaired shall be power disc-sanded to bright metal. So that a smooth reconditioned coating can be effected, surface preparation shall extend into the undamaged galvanized coating.
 - c. Touch-up paint shall be an organic cold-galvanized compound having a minimum of 94% zinc dust in the dry film.
 - d. The paint shall be spray- or brush-applied in multiple coats until a dry film thickness of 8 mils minimum has been achieved. A finish coat of aluminum paint shall be applied to provide a color blend with the surrounding galvanizing.

- e. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.
- 2. Zinc-Based Solder:
 - a. Surfaces to be reconditioned with zinc-based solder shall be clean, dry, and free of oil, grease, and corrosion products.
 - b. Areas to be repaired shall be wire-brushed.
 - c. Heat shall be applied slowly and broadly close to but not directly onto the area to be repaired. The zinc-based solder rod shall be rubbed onto the heated metal until the rod begins to melt. A flexible blade or wire brush shall be used to spread the melt over the area to be covered. The zinc-based solder shall be applied in a minimum thickness of 2 mils.
 - d. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.

END OF SECTION

SECTION 05 56 00

ANCHOR BOLTS AND POST-INSTALLED ANCHORS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Anchor bolts, expansion bolts, adhesive anchors, and screw anchors.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A36/A36M—Standard Specification for Carbon Structural Steel.
- B. ASTM F1554—Anchor Bolts, Steel, 36, 55, and 105-ksi yield strength.
- C. ICC-ES International Code Council—Evaluation Service.
- D. AC 193—Acceptance Criteria for Mechanical Anchors in Concrete Elements.
- E. AC 308—Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete.
- F. ACI 355.2—Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary.
- G. ACI 355.4—Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.

PART 2—PRODUCTS

2.01 GENERAL

- A. Unless indicated otherwise on the Drawings or specified, use the following bolt material for the various installation situations:
 - 1. Stainless Steel: For all submerged locations, below final grade, and in contact with aluminum appurtenances and other items not to be painted. Also for anchoring equipment, unless otherwise specified.
 - 2. Steel: In other locations in contact with items to be painted or encased in concrete.

2.02 EXPANSION BOLTS

- A. Expansion bolts shall be KWIK Bolt TZ by Hilti, Inc., Power-Stud+ SD2, SD4, or SD6 by DeWalt, Strong-Bolt or Strong-Bolt 2 by Simpson Strong-Tie Anchor Systems, or approved equal.
- B. All expansion bolts shall comply with the 2021 International Building Code, AC 193, and ACI 355.2. They shall be ICC-ES approved for use in cracked and uncracked concrete.

- C. Expansion bolts will not be permitted as substitutes for embedded anchor bolts except with the prior written acceptance of ENGINEER or where otherwise specifically called for.

2.03 ADHESIVE ANCHORS

- A. Adhesive anchors shall be HIT HY 200 by Hilti, Inc., Red Head C6+ or Red Head A7+ by ITW, Pure 110+ or AC200+ by DeWalt, Set-XP by Simpson Strong-Tie Anchor Systems, or approved equal.
- B. All adhesive anchors shall comply with the 2021 International Building Code, AC 308, and ACI 355.4. They shall be ICC-ES approved for use in cracked and uncracked concrete.

2.04 SCREW ANCHORS

- A. Screw anchors shall be KWIK HUS-EZ by Hilti, Inc., Screw-Bolt by DeWalt, Titen-HD by Simpson Strong-Tie Anchor Systems, or approved equal.
- B. All screw anchors shall comply with the 2021 International Building Code. They shall be ICC-ES approved for use in cracked and uncracked concrete.

PART 3-EXECUTION

3.01 ANCHOR BOLTS

- A. Anchor bolts for structural members shall be located as shown and specified.
- B. Anchor bolts for mechanical equipment shall have embedment length, edge distances, and spacing as required by the equipment manufacturer.
- C. All dirt or foreign materials shall be removed prior to embedding into concrete. After anchor bolts have been embedded, their threads shall be protected by grease and by installing the nuts or by other means until the time of installation of the equipment or metal work.

3.02 EXPANSION BOLTS

- A. Unless otherwise noted on the Drawings, expansion bolt edge distance and spacing shall be in accordance with manufacturer's printed installation instructions.
- B. Bolt embedment shall at least equal 6-bolt diameters.
- C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.
- D. Where location of bolts is adjustable, reinforcing steel shall be located prior to drilling holes and bolts shall be located to clear reinforcing steel.

3.03 ADHESIVE ANCHORS

- A. At locations shown on the Drawings, reinforcing bars or threaded rod shall be provided in existing concrete by drilling holes, injecting epoxy adhesive, and inserting the reinforcing bar.
- B. All existing surfaces to receive adhesive anchors, including the entire area in contact with the new concrete, shall be cleaned and roughened to amplitude of 1/4 inch.
- C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.
- D. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at the time of installation.
- E. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.
- F. CONTRACTOR shall arrange an anchor manufacturer's representative to provide on-site installation training for installation of their adhesive anchor system products. Submit documentation that all CONTRACTOR's personnel or subcontractors who install adhesive anchors have been trained prior to the announcement of anchor installation.
- G. Adhesive anchors in horizontal and upwardly inclined orientations to resist sustained tension loads are subject to the following requirements:
 - 1. They shall be installed by personnel certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent, as approved by ENGINEER.
 - 2. They require continuous special inspection during installation. CONTRACTOR shall notify ENGINEER and SPECIAL INSPECTOR of the schedule for these anchor installations to permit coordination of inspections.

3.04 SCREW ANCHORS

- A. Unless otherwise noted on the Drawings, screw anchor edge distance and spacing shall be in accordance with manufacturer's recommendations.
- B. Anchor embedment shall at least equal 6-bolt diameters.
- C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.
- D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

END OF SECTION

SECTION 06 11 00

WOOD FRAMING AND SHEATHING

PART 1—GENERAL

1.01 SUMMARY

- A. Work included:
 - 1. Roof Sheathing.
 - 2. Miscellaneous Framing and Sheathing.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ALSC—American Lumber Standards Committee.
- B. APA—American Plywood Association.
- C. AWWA—American Wood Preservers Association.
- D. NFPA—National Forest Products Association.
- E. NLGA—National Lumber Grades Authority.
- F. SPIB—Southern Pine Inspection Bureau.
- G. WCLIB—West Coast Lumber Inspection Bureau.
- H. WWPA—Western Wood Products Association.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protect lumber and other building materials and keep under cover both in transit and at the job site. Protect from dampness. Stack framing lumber and plywood to provide proper air circulation. Locate stacks on well-drained areas. Support 6 inches above grade and protect with waterproof cover.

PART 2—PRODUCTS

2.01 MATERIALS

- A. Lumber shall be kiln-dried with moisture content not to exceed 19% at time of installation and grade marked according to the National Lumber Manufacturer's Association.
- B. All studs shall be 2 inches by 4 inches nominal or 2 inches by 6 inches nominal as shown on the Drawings and shall be No. 2 Douglas Fir, No. 2 Southern Pine, or better.

- C. Plywood roof, wall, and ceiling sheathing shall be grade C-D (CDX), Exposure 1, or better, graded in accordance with the American Plywood Association.
- D. Wood sills, plates, blocking, etc., to be same grade as studs.

PART 3—EXECUTION

3.01 FRAMING

- A. General: All rough framing lumber and all other wood framing, studs blocking, and furring shall be accurately set to required lines and levels, closely fitted, shimmed, and rigidly secured in place.
- B. Place all wood studs in sizes as shown and spaced at 16 inches o.c., unless noted otherwise. Erect studs on single bottom and single top plate at nonbearing walls, double studs at all openings, triple studs at corners. Install blocking between studs as required. Bolt plates and blocking to concrete at 32-inch centers, unless noted otherwise. Space framing to receive electrical piping or ductwork without cutting joist. Verify all duct and piping runs prior to framing to eliminate conflict. Stud walls shall extend up to the precast ceiling plank. Stud walls shall be adequately braced off of other stud walls and/or masonry walls.
- C. Construct load bearing, framing, and curb members full length without splices.
- D. Provide double studs at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
- E. Unless shown otherwise, provide double joists at floor and ceiling openings over 24 inches wide and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.
- F. Unless shown otherwise, provide mid-span bridging between joists spanning 12 feet or more. Unless shown otherwise, provide solid wood blocking at ends of joists placed between alternate joist spaces.

3.02 PLYWOOD SHEATHING

- A. Plywood sheathing shall be nailed at 6 inches on center at edges and 12 inches on center at intermediate supports with 10d common nails.
- B. Secure roof sheathing perpendicular to framing members with ends staggered and sheet ends over firm bearing. Use sheathing clips between sheets between roof framing members, or provide solid edge blocking between sheets.

3.03 CONNECTIONS

- A. All framing connections and nailing shall be in accordance with the details shown and/or the 2021 International Building Code minimum requirements, whichever is more restrictive.
- B. Framing connectors shall be Simpson Strong Tie, Mitek, or equal. Connector numbers shown on details are Simpson. Submit engineering data on any substitutes.

- C. Connectors shall be installed in accordance with manufacturer's requirements.

END OF SECTION

SECTION 06 11 10
WOOD BLOCKING AND CURBING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Wood Blocking.
 - 2. Wood Furring and Grounds.
 - 3. Preservative Treatment of Wood.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ALSC—American Lumber Standards Committee.
- B. AWWPA—American Wood Preservers Association.
- C. ICC-ES - International Code Council Evaluation Service.
- D. NFPA—National Forest Products Association.
- E. NLGA—National Lumber Grades Authority.
- F. SPIB—Southern Pine Inspection Bureau.
- G. WCLIB—West Coast Lumber Inspection Bureau.
- H. WWPA—Western Wood Products Association.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00—Submittals.
- B. Submit ICC-ES Evaluation report for each preservation treatment product to be used.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be thoroughly sealed and protected from weather during transport and at the jobsite. Protect from dampness.

PART 2–PRODUCTS

2.01 MATERIALS

- A. Lumber for blocking, furring, and grounds shall be “standard” grade Douglas Fir, No. 2 Southern Pine, or better, graded in accordance with the WWPA, WCLIB, NLGA, or SPIB grading rules as applicable. Lumber shall bear the grading agency's stamp.
- B. Wood shall be kiln-dried with moisture content not to exceed 19% at time of installation.
- C. All lumber furnished under this section shall be pressure-treated with a micronized copper azole (MCA) or chromated copper arsenate (CCA) waterborne preservative to a minimum retention of 0.40 pounds per cubic foot in pounds per cubic foot of preservative actives as required by the manufacturer to meet the relevant use category as defined in AWPA Standard U1-24–User Specification for Treated Wood.
- D. MCA and CCA preservative treatment shall comply with AWPA Standards P61 and P23, respectively.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Provide and install wood curbs, cants, blocking, furring, and grounds of proper size and shape where shown on the Drawings and where required to secure other work or equipment in place.
- B. Members shall be installed true to lines, level, plumb, and secure.
- C. Connections and nailing shall be in accordance with the details shown and/or the 2021 International Building Code minimum requirements, whichever is more restrictive.
- D. Apply brush-on wood preservative treatment to cuts in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 06 17 53

PLATE CONNECTED WOOD TRUSSES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. All Materials, Equipment, and Labor Necessary for the Prefabrication, Delivery, and Permanent Setting of Wood Trusses on Buildings.
 - 2. Bridging.
 - 3. Temporary And Permanent Bracing.
 - 4. Related Hardware.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ALSC—American Lumber Standards Committee.
- B. APA—American Plywood Association.
- C. ASTM A653—Sheet Steel, Zinc-Coated (Galvanized) by the Hot Dip Process, (Structural Physical) Quality.
- D. AWWA—American Wood Preservers Association.
- E. NFPA—National Forest Products Association.
- F. SPIB—Southern Pine Inspection Bureau.
- G. TPI—Truss Plate Institute.
- H. WWPA—Western Wood Products Association.

1.03 DESIGN REQUIREMENTS

- A. The basic design loads shall be in accordance with the 2021 International Building Code.
- B. Dead Loads and Collateral Loads: Trusses shall be designed for loads shown on the Drawings.
- C. Live Loads:
 - 1. Roof live loads shall be shown on the Drawings and in accordance with the 2021 International Building Code.
 - 2. Design for unbalanced snow loads in accordance with the building code.
 - 3. Design for sliding and drifted snow loads as shown on the drawings.
 - 4. Roof live loads shall be applied to the horizontal projection of the roof.

- D. Wind Loads: Wind loads shall be as shown on the Drawings and in accordance with the 2021 International Building Code.
- E. Concentrated Loads: Design for any concentrated loads shown on the Drawings.
- F. Combination of Loads: The combining of loads for design purposes shall be as prescribed with the 2021 International Building Code.

1.04 SUBMITTALS

- A. Submittals shall be as in Section 01 33 00–Submittals.
- B. Professional Engineer: All truss designs shall bear the name and seal of a State of Illinois licensed structural engineer. CONTRACTOR shall be responsible for submitting the required additional copies of truss drawings with original stamp and signature for submittal to the State of Illinois. These materials must be submitted prior to installation.
- C. Truss designs shall include the following information: Pitch, span, dimensions, and spacing of trusses; truss bearing sizes and locations; design loading of truss and allowable stress increase; axial forces in each truss member; nominal sizes and location of connector plates at all joints; size, species, and stress of grade of lumber for all truss members; camber; permanent lateral bracing as required by design to reduce buckling length of individual truss members; and handling and erection recommendations. Where sheathing is not attached directly to truss bottom chords, provide bottom chord bracing and bridging as required by design to resist wind uplift loads.

1.05 QUALITY ASSURANCE

- A. The design and fabrication criteria of all wood trusses shall meet the following:
 - 1. "National Design Specifications for Stress-Grade Lumber and its Fastenings," by National Forest Products Association (latest revision).
 - 2. "Timber Construction Standards," by American Institute of Timber Construction (latest revision).
 - 3. "Design Specifications for Light Metal Plate Connected Wood Trusses," by Truss Plate Institute (latest revision).
 - 4. 2021 International Building Code.
- B. Fabricator Manufacturer: Minimum three years experience in successful fabrication of trusses comparable to type indicated for this project.
- C. Design Trusses under direct supervision of a structural engineer experienced in design of this work and licensed in the State of Illinois.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Fabricated trusses and subcomponents shall be so handled and stored that they are not subject to damage.
- B. If the trusses are to be stockpiled prior to erection, sufficient bearing points and/or bracing shall be provided to prevent excessive lateral bending or tipping over.

PART 2-PRODUCTS

2.01 MATERIALS

A. Lumber:

1. All lumber used for truss members shall be Spruce-Pine-Fir, Douglas Fir, Southern Pine, Hem-Fir, or Western Larch and shall conform to lumber for trusses and shall have a minimum nonrepetitive fiber bending strength of 1,050 psi. If design calls for use of a lumber with greater strength, then that lumber shall be used for the associated members.
2. At the time of delivery, the moisture content of all lumber shall not exceed 19% kiln-dried.
3. All lumber shall conform to the species and shall be fully recognized nominal sizes shown on the Drawings or truss engineering design.
4. All members shall be cut from lumber which bear the proper grade-mark stamps of a licensed lumber inspection agency.

B. Connectors:

1. All truss connector plates shall be manufactured from ASTM A653, Grade A, prime commercial quality galvanized sheet steel of no less than 20-gauge thickness which has a minimum yield of 33,000 psi and a minimum ultimate tensile strength of 45,000 psi.
2. The corrosion-resistant coating shall be ASTM A924-Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements, Coating Designation C90 or G60, ASTM A879-Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface, Coating Class C, or such treatment as will give equivalent corrosion protection.
3. The connectors shall have a series of nail-like projections which are designed to separate the fibers of the wood into which they are pressed in accordance with accepted nailing practices.
4. Where field-assembly of truss subcomponents is necessary, the connections shall be in accordance with the details shown on the truss design drawings, approved by a Professional Engineer.

2.02 FABRICATION

- A. All trusses and other roof structural components shall be fabricated in a properly equipped manufacturing facility of a permanent nature. They shall be manufactured by experienced workmen using precision cutting and truss fabricating equipment under the direct supervision of a qualified foreman. All trusses shall be fabricated under strict rules of inspection and quality control as the local code may require and be open to the observation of ENGINEER or its representative at all times.
- B. All truss members shall be accurately cut to length, angle, and be true to line to provide tight joints for finished truss.
- C. All truss members and connector plates shall be properly placed in special jigs and the members tightly clamped in place remaining in that position until the connector plates have been pressed into the lumber simultaneously on both sides of the joints.

- D. Camber shall be built into the trusses, as noted on the engineering truss designs, by properly positioning the members in the fabricating jig. No camber will be allowed on the bottom chord.

PART 3—EXECUTION

3.01 ERECTION

- A. Install trusses in accordance with manufacturer's instructions and TPI BWT (latest revision).
- B. Framing anchors and/or truss hangers shall be provided by CONTRACTOR, as required, or detailed to withstand all loads, both dead and live, as well as wind and transfer loads to bearing.
- C. Field erection of the trusses, including items such as handling, safety precautions, and temporary bracing to prevent toppling or the domino effect on the trusses during erection, and any other safeguards or procedures consistent with good workmanship and good building erection practices, shall be employed.
- D. During the entire construction period, all contractors shall provide means for adequate distribution of concentrated loads so that the carrying capacity of any one truss and/or other component is not exceeded.
- E. Proper erection bracing shall be installed to hold the trusses true and plumb and in safe condition until permanent truss bracing and bridging can be solidly nailed in place to form a structurally sound roof framing system. All erection and permanent bracing shall be installed and all components permanently fastened before the application of any loads. Provide all permanent bracing necessary for truss stability. Where sheathing is not attached directly to truss bottom chord and where required by design, provide bottom chord bracing and bridging as required to resist wind uplift loads.
- F. Frame openings between trusses with lumber in accordance with Section 06 11 00—Wood Framing and Sheathing.

END OF SECTION

SECTION 07 21 12

BOARD INSULATION

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes board insulation for cavity wall construction, for perimeter foundation walls, and under floor-slabs on-grade.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 2–PRODUCTS

2.01 CAVITY WALL INSULATION

- A. Cavity wall insulation shall be 3-inch-thick polyisocyanurate foam board with foil facing on both sides. Aged thermal resistance (R-value) at 72°F shall be a minimum of 19.0.
- B. Acceptable products include the following, or equal: Thermax Sheathing by DuPont.
- C. Adhesive for adhering insulation to backup wall shall be as recommended by the insulation manufacturer.

2.02 FOUNDATION AND UNDER-SLAB INSULATION

- A. Foundation and under-slab insulation shall be 2-inch-thick extruded polystyrene closed cell rigid foam board with continuous skins on both sides. Aged thermal resistance (R-value) at 75°F shall be a minimum of 10.0.
- B. Acceptable products include the following, or equal:
 - 1. Styrofoam Square Edge by DuPont.
 - 2. Foamular NGX 250 by Owens Corning.

PART 3–EXECUTION

3.01 INSTALLATION–CAVITY WALLS

- A. Insulation shall be installed horizontally within the cavity space between masonry wythes.
- B. Take care during installation so that all insulation boards are butted and installed between ties and fit flush against inner wythe or backup wall.
- C. Cut insulation neatly to fit around obstructions across the cavity such as vents, louvers, pipes, and conduits.

- D. Secure insulation in place against backup wall with mastic adhesive and observe label directions.

3.02 INSTALLATION—FOUNDATION WALLS AND UNDER FLOORS

- A. Rigid insulation shall be laid dry against the foundation walls as backfill is placed. Insulation shall be located at all perimeter frost walls and below-grade walls of buildings and structures containing areas that may be occupied by personnel.
- B. At perimeter frost wall foundations, insulation shall be as shown on the Drawings.
- C. Insulation under edges of slab-on-grade floors shall be as shown on the Drawings.

END OF SECTION

SECTION 07 21 13

BATT INSULATION

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes batt insulation for attic spaces; sound batt insulation in interior stud walls; batt insulation in roof, and insulation vent system between roof trusses as called for on the Drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM C665—Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

PART 2—PRODUCTS

2.01 EXTERIOR WALL AND ROOF INSULATION

- A. Batt insulation placed on top of precast plank in attic spaces shall be unfaced fiberglass batt 18 inches thick conforming to ASTM C665, Type 1, and providing a minimum R-value of 57. Multiple layers of batt placed perpendicular to each other may be used in place of one layer of 18-inch batt.
- B. All batt insulation in attic spaces shall be unfaced or foil-reinforced kraft-faced meeting the 2021 International Building Code or governing local building code requirements.
- C. Acceptable manufacturers include the following, or equal:
 - 1. Owens Corning.
 - 2. Manville.
 - 3. Certainteed.

2.02 SOUND BATT INSULATION

- A. Sound batt insulation in interior stud walls shall be an unfaced fiberglass acoustical insulation complying with ASTM C665, Type 1. The wall system shall have an STC of 46 with 3 1/2 inches of insulation.
- B. Acceptable manufacturers include the following, or equal:
 - 1. Owens Corning.
 - 2. Manville.
 - 3. Certainteed.

2.03 INSULATION VENTS

- A. Insulation vents shall be 2 inches high by 14 inches wide by 48 inches long, tear-resistant high-impact plastic as manufactured by proVent, or equal.

PART 3—EXECUTION

3.01 INSTALLATION—ROOF INSULATION

- A. Prior to installing insulation, vapor barrier shall be in place (See Section 07 26 00—Vapor and Air Barrier).
- B. Insulation shall be loose laid on the precast plank over the vapor barrier. If two layers of insulation are used to make up the required thickness, upper layer shall be installed perpendicular to the lower layer.

3.02 INSTALLATION—WALL INSULATION

- A. Install per manufacturer's recommendations.
- B. Carefully cut insulation around wall penetrations.
- C. Friction fit insulation between studs.

3.03 INSULATION VENTS

- A. Insulation vents shall be installed between roof trusses at the truss bearing ends providing an unobstructed air channel from the soffit into the attic.

END OF SECTION

SECTION 07 26 00

VAPOR AND AIR BARRIER

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes:
 - 1. Vapor barrier under concrete floors on grade, in exterior construction, and on top of precast roof plank.
 - 2. Air barrier in masonry double wythe walls on concrete block backup wall.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 2–PRODUCTS

2.01 MATERIALS

- A. Vapor barrier for below slabs: Vapor barrier shall consist of 10 mil ASTM E1745 Class B polyethylene sheeting with less than 0.3 perm water vapor permeance in accordance with ASTM E96.
- B. Vapor barrier for precast plank construction: Vapor barrier shall consist of 6 mil ASTM D4397, Class B polyethylene sheeting with less than 0.3 perm water vapor permeance in accordance with ASTM E96
- C. Air/vapor barrier for masonry cavity wall construction shall be fluid applied membrane, ExoAir 120 by Tremco, or equal. Apply to outside face of inner wythe of concrete block prior to installation of rigid insulation. Apply in strict accordance with manufacturer's instructions. Air/vapor barrier shall be included in all new cavity wall construction on the project.

PART 3–EXECUTION

3.01 INSTALLATION–UNDER CONCRETE FLOORS ON GRADE

- A. Provide continuous vapor barrier under concrete floors on grade that are 8 inches or less in thickness, lap all joints a minimum of 12 inches.
- B. Specific location of vapor barrier (whether directly under slab or under granular cushion) shall be as shown on the Drawings.

3.02 INSTALLATION ON TOP OF PRECAST ROOF PLANK

- A. Provide continuous vapor barrier on top of precast plank.
- B. Lap all joints a minimum of 12 inches and tape all joints.

3.03 INSTALLATION OF AIR BARRIER

- A. Install air barrier on outside face of inner wythe of concrete block in cavity wall construction.
- B. Install air barrier per manufacturer's recommendations and approved details.

END OF SECTION

SECTION 07 61 00
SHEET METAL ROOFING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Standing Seam Metal Roof System.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A653—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. SMACNA—Architectural Sheet Metal Manual.
- C. NRCA—Roofing and Weatherproofing Manual (including construction details) and Handbook of Accepted Roofing Knowledge.
- D. Manufacturer's Handbook of Construction Details.
- E. AISI "Specifications for the Design of Light-Gauge Cold Formed Steel Structural Member, latest edition."

1.03 SUBMITTALS

- A. See Section 01 33 00—Submittals for general submittal requirements.
- B. Shop drawings: Submit fabrication details, jointing details, fastening methods, and termination details.
- C. Samples: Submit one sample of each type of prefinished and preformed panel showing color and profile match. Provide same for closures.
- D. Warranty from manufacturer: Submit sample of manufacturer's 20-year warranty on weather tightness, flashing, inclusive.

1.04 QUALITY ASSURANCES

- A. Perform work in accordance with manufacturer's instructions and these specifications.

1.05 QUALIFICATIONS

- A. Material Manufacturer: Five years documented experience with this type of construction.

- B. Installer: Five years of satisfactory documental experience in the installation of this type of work.

1.06 WARRANTIES

- A. Architectural finish coating shall be provided with a 20-year guarantee against cracking, chipping, peeling, and fading.
- B. Warrant materials and workmanship for 20 years for weather tightness, flashing, inclusive.

1.07 SYSTEM DESIGN

- A. All components of the paneling system shall be designed in accordance with sound engineering methods and practices.
- B. The panels shall be designed in accordance with AISI "Specifications for the Design of Light Gauge Cold Form Steel Structural Members," latest edition.
- C. The paneling system and its attachments shall be designed to support live, snow, and wind loads.
- D. Panels shall be designed for 20 psf live load.
- E. The roof system shall carry UL wind-uplift Class 90 rating.

PART 2-PRODUCTS

2.01 MATERIALS

- A. Metal Roof System:
 - 1. Roof panels shall be roll formed panels of uniform width 12 to 18 inches wide with two major corrugations, 2 1/2 inches high, 16 inches (equal to panel width) on center.
 - 2. Panel materials shall be 24 gauge, hot-dipped galvanized steel (50,000 psi yield), G-90 coating conforming to ASTM A653 specification.
- B. Fasteners:
 - 1. All connections of panels to structural members, except at eave, shall be made with clips with moveable tabs that are seamed into the standing seam side lap.
 - 2. Panel clips shall be fastened to structural members with fasteners as per manufacturer's erection drawings.
 - 3. Panel-to-panel connections shall be made with a positive, field-formed standing double-lock seam, formed by a special seaming device.
- C. Underlayment and Eave Protection Membrane:
 - 1. Underlayment for all areas, except along eaves, shall be No. 30 unperforated asphalt saturated felt conforming to ASTM D226.
 - 2. Eave (ice dam) protection applied to 4 feet inside the exterior wall line eaves shall be a sheet membrane of rubberized asphalt bonded to sheet polyethylene, 40 mils minimum total thickness, with strippable release paper. Acceptable products include the following, or equal:

- a. Ice and Water Shield by W.R. Grace Company.
- b. Winter Guard Waterproofing Shingle Underlayment by Certainteed Corporation.

2.02 MANUFACTURERS AND PRODUCTS

- A. Roof panels shall be roll-formed Stand N' Seam panels as manufactured by Fabral, or equal.
- B. Sealants: Per Section 07 90 00—Caulking and Sealants.
- C. Flashing at eave, gable, ridge, and penetrations shall be in accordance with manufacturer's recommendations and Section 07 62 00—Flashing and Sheet Metal.
- D. Unless shown otherwise on the Drawings, provide continuous ridge venting using manufacturer's standard ridge/hip flashing and manufacturer's approved detail. Provide vent material to prevent entry of insects.
- E. Unless shown otherwise on the Drawings, provide snow guards on the roof above all exterior door openings, extending minimum 1 foot beyond each edge of door. Snow guards shall consist of a snow bar mounted to a nonpenetrating clamp attached to the standing seam ribs. Snow bar shall incorporate a prepainted metal strip to match the roof panel color. Acceptable products include Color Guard Snow Guard with prepainted insert and S-5-U clamps by LM Curbs, Longview, Texas, or equal.

2.03 FINISHES

- A. Finishes on all exterior surfaces shall be a 1.0 mil DFT two-coat, factory-applied, 70% Kynar, 500 fluoropolymer coating over an epoxy prime coat.
- B. All exposed fasteners shall be provided with the same finish as the sheet material products.
- C. Colors shall be selected by OWNER.

PART 3—EXECUTION

3.01 INSTALLATION

- A. The panels shall be attached to the supporting structurals by means of a clip device. The clip shall occur at the panel major corrugation.
- B. Panel sidelaps shall be field-seamed by a seaming device; all sidelap sealant shall be factory-applied.
- C. Panel endlaps, when required, shall be at least 6 inches and sealed with field-applied sealant. One panel end shall be "swaged" to provide nestible, watertight endlaps.
- D. Provisions for thermal expansion/contraction movement of the panel shall be accomplished by the use of clips with a moveable tab. The tabs shall be factory-centered on the roof clip to provide full movement in either direction.

- E. The roof shall provide for thermal expansion/contraction without detrimental effect on the roof panel when there is a 100°F temperature differential between the interior structural framework of the building and the roof panels.

END OF SECTION

SECTION 07 62 00
FLASHING AND SHEET METAL

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes masonry wall flashing, custom-fabricated sheet metal flashing and counter flashing at: Eave, gable, and ridge lines; roof-mounted equipment; vent stacks; and other locations.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A653–Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- B. ASTM A924–General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
- C. ASTM B32–Solder Metal.
- D. ASTM B209–Aluminum and Alloy Sheet and Plate.
- E. ASTM D4586–Asphalt Roof Cement, Asbestos-Free.
- F. SMACNA–Architectural Sheet Metal Manual.

1.03 SUBMITTALS

- A. See Section 01 33 00–Submittals for general submittal requirements.
- B. Shop drawings: Submit fabrication details, jointing details, fastening methods, and termination details.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA standard details and requirements.

1.05 QUALIFICATIONS

- A. Fabricator and installer shall be a company specializing in sheet metal fabrication work with a minimum of 5 years of verifiable experience in that field.

1.06 WARRANTY

- A. Kynar 500 coating shall be provided with a 20-year guarantee against cracking, chipping, peeling, and fading.

PART 2—PRODUCTS

2.01 MATERIALS

- A. Masonry wall flashing and flashing around windows, doors, and other openings shall be 32 mil of self-adhesive rubberized asphalt integrally bonded to 8 mil of cross-laminated, high-density polyethylene film to provide a minimum 40 mil thick membrane. Flashing shall be PERM-A-BARRIER wall flashing as manufactured by Grace Construction Products, or equal. Provide primer or surface conditioner as recommended by manufacturer.
- B. Galvanized Steel Sheet: 26 gauge meeting ASTM A525, Grade A with G90 zinc coating.
- C. Aluminum Sheet: 0.032 inch thick meeting ASTM B209.
- D. Fasteners: Same material and finish as flashing sheet. Stainless steel fasteners may be used with any flashing material. Provide soft neoprene washers with fasteners.
- E. Primer: Zinc chromate type.
- F. Protective Backing Paint: Bituminous type.
- G. Sealant: See Section 07 90 00—Caulking and Sealants.
- H. Bedding Compound: Rubber asphalt or butyl type.
- I. Plastic Cement: ASTM D4586, Type I or II.
- J. Reglets: Galvanized steel or PVC, surface-mounted or recessed.
- K. Solder: ASTM B32. Soldering is not permitted on aluminum or stainless steel sheet.

2.02 FABRICATION

- A. All flashing and fascia shall be formed to the configurations shown on the Drawings and/or the applicable manufacturer's details, or in accordance with SMACNA standard details where not shown on the Drawings, or in manufacturers details. Form sections true to shape, accurate in size, square, and free from buckles, kinks, or other defects.
- B. All exposed edges shall be folded or returned on themselves at least 1/2 inch. Corners shall be mitered and seamed.
- C. Form pieces in the longest possible lengths. Form material with flat lock seams.
- D. All sections shall be provided with slip joints at 8 feet on center.
- E. Cleats shall be fabricated of the same materials as the flashing sheets and shall be interlockable with the sheets.

- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form a drip.
- G. Fabricate corners from one piece with minimum 18-inch-long legs. Seam or solder for rigidity and seal with sealant.

2.03 FINISH

- A. Back paint all sheet metal with asphaltum paint where sheet metal surfaces come in contact with masonry or steel.
- B. Flashing and fascia shall be painted where exposed to view from the ground. Galvanized steel shall be painted in accordance with Section 09 91 00–Painting. Aluminum shall be coated with a Kynar 500 coating system.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Through-wall flashing shall be installed 1/2 inch back of the outside face of the wall, carried through the outside wythe, turned up in the collar, and adhered to back-up wall as shown on the Drawings. At no time should any portion of the flashing be allowed to hang or drape beyond the width of the wall. All laps shall be sealed and shall not be less than 3 inches in width. Flashing around openings shall extend at least 3 inches beyond each side of opening.
- B. Fit flashing tight in place. Make corners square, surfaces true and straight in planes, and line accurate to profiles. Seal metal joints watertight.
- C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted by ENGINEER.
- D. Insert flashings into reglets where shown on the Drawings. Seal flashings into reglets with sealant.
- E. Counter flashing shall be provided at all vertical masonry and/or concrete walls which extend above the roof line. The counter flashing shall be installed in a reglet unless otherwise shown. Surface-mounted reglets shall be used where noted.
- F. CONTRACTOR shall provide copper sleeves for hot pipes penetrating the roof as approved by the roofing manufacturer. The annular space between the sleeve and the pipe shall be packed with insulation capable of withstanding the maximum temperature of the pipe. CONTRACTOR to provide a galvanized steel rain collar welded to the hot pipe.

END OF SECTION

SECTION 07 71 00
MANUFACTURED ROOF SPECIALTIES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Metal Fascia, Soffit, and Coping.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. SMACNA—Architectural Sheet Metal Manual.

1.03 SUBMITTALS

- A. Submittals shall comply with requirements of Section 01 33 00—Submittals.
- B. Submit sample panels for selection of anodized or Kynar 500 finish colors.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA standard details.

1.05 WARRANTY

- A. Kynar 500 coating shall be provided with a 20-year guarantee against cracking, chipping, peeling, and fading.

PART 2—PRODUCTS

2.01 FASCIA

- A. Metal fascia system shall be constructed of 24 gauge galvanized steel and shall include all necessary angles, clips, corners, and other accessories of the same material as the finish panels.
- B. Acceptable products include the following, or equal: Fascia System by Fabral, Peterson Aluminum Corporation, and shall be made by the same manufacturer as the sheet metal roofing in Section 07 61 00—Sheet Metal Roofing.

2.02 SOFFIT

- A. Metal soffit system shall be constructed of 0.032-inch-thick aluminum sheet and shall include all necessary channels, angles, clips, flashing, fasteners, and other accessories of the same

material as the soffit panels. Soffit panels shall be fully vented to allow for ventilation and shall have stiffener grooves spaced at 6 inches on center.

- B. Acceptable products include the following, or equal: Fabral, PAC 750 by Peterson Aluminum Corporation, and shall be made by the same manufacturer as the sheet metal roofing in Section 07 61 00—Sheet Metal Roofing.

2.03 FINISHES

- A. Finish on all products shall be a 1.0 mil DFT two-coat factory-applied 70% Kynar 500 fluoropolymer coating over an epoxy prime coat. Colors shall be selected by OWNER. All exposed fasteners shall be provided with the same finish as the sheet metal products.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Install components in accordance with the Drawings and the manufacturer's instructions.
- B. Installation details shall be such as to allow for thermal expansion and contraction of the components and to provide for a complete weatherproof installation.

END OF SECTION

SECTION 07 71 23
GUTTERS AND DOWNSPOUTS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Aluminum Gutters and Downspouts.
 - 2. Precast Concrete Splash Pads.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM B209–Aluminum and Aluminum Alloy Sheet and Plate.
- B. SMACNA–Architectural Sheet Metal Manual.

1.03 DESIGN REQUIREMENTS

- A. Conform to SMACNA manual for sizing components for a 10-year storm event.

1.04 REGULATORY REQUIREMENTS

- A. Conform to the 2021 International Building Code or governing local building code for size and method of rainwater discharge.

PART 2–PRODUCTS

2.01 GUTTERS AND DOWNSPOUTS

- A. Gutters and downspouts shall be constructed of 0.032-inch-thick aluminum sheet conforming to ASTM B209 and shall be made from the same manufacturer as the fascia and soffit system.

2.02 ACCESSORIES

- A. Anchorage devices shall meet SMACNA or manufacturer's requirements.
- B. Gutter supports shall be straps and fasteners at maximum 3 feet 0 inch on center.
- C. Downspout supports shall be brackets of the appropriate size and spacing.
- D. Fasteners shall be aluminum or stainless steel.

2.03 SPLASH PADS

- A. Splash pads shall be precast concrete of the appropriate size with minimum 28-day compressive strength of 3,000 psi and minimum 5% air entrainment.

2.04 FABRICATION

- A. Form gutters and downspouts to SMACNA requirements.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion by providing expansion joints as required.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

- A. Finish on gutters and downspouts shall match finish on fascia system. All components, including fasteners and supports, shall be prefinished to match gutters and downspouts.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Install gutters, downspouts, and accessories with manufacturer's instructions.
- B. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Install gutters level.
- D. Seal metal joints watertight.
- E. Set splash pads under downspouts.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Silicone firestopping foam for sealing annular spaces around ductwork penetrations through fire-rated assemblies.
 - 2. Silicone firestopping sealant for sealing annular spaces around piping and conduit penetrations through fire-rated assemblies and to seal gaps at intersections of walls and floors/ceilings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. UL 1479–Fire Tests of Through-Penetration Fire Stops.
- B. UL–Fire Hazard Classifications.

1.03 REGULATORY REQUIREMENTS

- A. Firestopping materials and installation shall conform to the 2021 International Building Code requirements, including fire-resistance ratings and surface-burning characteristics.
- B. Provide certificate of compliance from local building inspector indicating approval of firestopping materials and installation.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. A small amount of hydrogen gas is released as the firestopping foam cures. Use forced-air ventilation when installing if areas of installation have less than 2 cubic feet of free air for each pound of liquid mixture being formed.

PART 2–PRODUCTS

2.01 FIRESTOPPING FOAM

- A. Firestopping foam for duct penetrations through fire-rated assemblies shall be a foamed-in-place silicone elastomer produced from two liquid components.
- B. Acceptable products include the following, or equal: Fire Barrier Rated Foam, FIP 1 Step by 3M Corporation.

2.02 FIRESTOPPING SEALANT

- A. Firestopping sealant for piping and conduit penetrations through fire-rated assemblies shall be a single-component silicone elastomer.
- B. Acceptable products include the following, or equal: Fire Barrier Silicone Sealant 2000 by 3M Corporation.

2.03 DAMMING MATERIAL

- A. Damming material shall be fire-resistant mineral fiber (if left in place) or other combustible material (if removed), as directed by the appropriate fire-tested designs.

2.04 PRIMER AND WRAP STRIP

- A. Primer for firestopping sealant shall be 3M Corporation, or equal.
- B. Wrap strip for firestopping sealant shall be 3M Fire Barrier FS-195 Wrap/Strip, or equal.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Firestopping foam and sealant shall be applied according to manufacturer's written instructions and shall achieve a fire rating equal to rating of construction which is penetrated. Substrate shall be free of all combustible materials (except damming material for later removal), loose impediment, oil, and other free liquids.
- B. Install damming material to establish the thickness and hold the firestopping foam/sealant in place. Follow the manufacturer's installation instructions. All gaps or cracks left after damming materials are in place must be sealed.
- C. Firestopping Foam: Immediately after mixing, dispense liquid foam into the penetration opening in accordance with manufacturer's installation instructions. Do not overfill penetration openings with liquid foam. Foam expands approximately three times its original volume during cure. Follow manufacturer's guidelines. If the opening is not filled when the cured foam has completed its expansion, repeat the installation and cure procedure until the opening is filled to the desired level. Allow 15 minutes between application of each shot.
- D. Firestopping Sealant: Apply primer and wrap strip in accordance with manufacturer's instructions prior to installing sealant. Apply sealant to a minimum depth of 1 1/2 inches and with uniform density and texture.
- E. Remove combustible damming material after foam/sealant has cured. Noncombustible damming material may be left in place.

3.02 QUALITY CONTROL

A. Firestopping Foam:

1. Perform manufacturer's four-step in-line quality control check at least once daily and upon changing to a new lot of material in order to review performance of both dispensing equipment and foam product prior to installing penetration seals. The four-step quality check includes evaluation for: snap time (cure rate); foam color and uniformity; foam cell structure; and foam density (weight).
2. Check cured penetration seal after 24-hour cure by removing damming materials to examine seal.
3. Cured foam should completely fill penetration. Fill all remaining gaps with freshly mixed foam or firestopping sealant.
4. Recheck after added material has cured 24 hours.
5. Damming materials required to achieve a fire rating must be returned to the penetration.
6. Clean up spills of liquid components with high-flash mineral spirit solvent, following manufacturer's instructions.
7. If necessary, trim excess cured foam with a sharp knife or blade.

B. Firestopping Sealant:

1. Check completed work for complete adhesion and seal 48 hours after sealant application.
2. Clean adjacent surfaces of excess sealant using a compatible solvent in accordance with the manufacturer's instructions.

END OF SECTION

SECTION 07 90 00
CAULKING AND SEALANTS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Caulking and sealants on the project, including primers and backer rod material.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM C920–Elastomeric Joint Sealants.

1.03 SUBMITTALS

- A. Submittals shall comply with provisions of Section 01 33 00–Submittals.
- B. Submit color chart for each sealant used on project. Colors will be selected by ENGINEER.
- C. Submit copies of warranty.

1.04 WARRANTY

- A. Caulked joints shall be weathertight and guaranteed watertight by installer for two years from the earlier of either the date established for partial utilization in accordance with GC 15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project. Deliver original guarantee to OWNER with copies to ENGINEER.

PART 2–PRODUCTS

2.01 CAULK–NONSUBMERGED AND SUBMERGED NON-POTABLE APPLICATIONS–GENERAL

- A. Caulk for nonsubmerged and submerged non-potable water contact applications in all locations except floor joints shall be a one-part or two-part polyurethane sealant.
- B. Acceptable products include the following, or equal:
 - 1. Masterseal NP1 by Master Builders Solutions.
 - 2. Vulkem 116 by Tremco, Inc. (exterior applications only).
 - 3. Dymonic 100 by Tremco, Inc.
 - 4. Sikaflex-2c NS EZ Mix by Sika Products.

2.02 CAULK–NONSUBMERGED AND SUBMERGED NON-POTABLE WATER APPLICATIONS–FLOOR JOINTS

- A. Caulk for floor joints in nonsubmerged and submerged non-potable water contact applications shall be a one-part, self-leveling, polyurethane sealant.
- B. Acceptable products include the following, or equal:
 - 1. MasterSeal SL1 by Master Builders Solutions.
 - 2. Vulkem 45 SSL by Tremco, Inc.
 - 3. Sikaflex-2c SL by Sika Products.

2.03 CAULK–VERTICAL EXPANSION JOINTS

- A. Caulk at vertical expansion joints in nonsubmerged and submerged non-potable water contact applications shall be a one-part or two-part polyurethane sealant.
- B. Caulk shall be capable of $\pm 50\%$ joint movement.
- C. Acceptable products include the following, or equal:
 - 1. Dymonic 100 by Tremco, Inc.
 - 2. Sikaflex-2c NS EZ Mix by Sika Products.

2.04 ACCESSORIES

- A. Backer rod shall be flexible, closed-cell polyethylene rod stock sized to be under at least 25% compression when positioned in the joint. In shallow joints and where backer rod is not used, polyethylene bond breaker tape shall be used. It is essential that the caulk bond to the side of the joint but not to the base of the joint.
- B. Primer(s) shall be used where required by the manufacturer for the specific product(s) used and the specific application(s) intended. Specific product(s) shall be as recommended by the manufacturer.
- C. Cleaning fluid shall be methyl ethyl ketone (MEK), methyl isopropyl ketone (MIK), or similar solvent material, which will not etch or mar metal finishes and shall be the product of a nationally recognized manufacturer of type expressly recommended for use with the caulking or sealant compound used.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Seal completely all joints around entire perimeter of all openings in all exterior walls (inside and outside faces), including joints at all exterior doors, windows, louvers, sills, and elsewhere as noted on the Drawings and as necessary to seal all open joints in the building in a complete manner. Joints in exterior walls shall be caulked in a completely weathertight manner. Joints between interior walls and concrete ceilings and other interior joints shall be caulked as indicated on the Drawings. Caulking not specified in other sections shall be performed under this heading.

- B. All caulking shall be done in accordance with manufacturer's specifications. Allow minimum 28-day curing period for concrete, grout, or mortar prior to caulking unless requested otherwise. All caulking shall occur only when the temperature is above 40°F.
- C. Joints shall be thoroughly cleaned and primed before caulking in accordance with manufacturer's instructions. Unless otherwise shown, joints shall be square in cross section 1/2-inch by 1/2-inch and shall comply with manufacturer's joint width/depth ratio limitations.
- D. Backer rod shall be used in all openings 3/4 inch or more in depth and shall be tightly packed to completely fill the space to 1/2 inch back of face. The 1/2 inch shall then be filled with caulking compound.
- E. Caulking shall be done by hand gun. Compound shall be driven into joint grooves with sufficient pressure to force out all air and fill joint grooves solidly. Caulking where exposed shall be free of wrinkles and shall be uniformly smooth.
- F. At completion of caulking, clean off all excess material from adjoining surfaces and material. Entire installation shall be left in a clean, weathertight condition.

END OF SECTION

SECTION 08 11 00

STANDARD STEEL DOORS AND FRAMES

PART 1–GENERAL

1.01 SUMMARY

- A. Work included: Thermally-insulated steel doors and frames.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/SD1-100–Standard Steel Doors and Frames.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.
- B. In addition to shop drawings and product data, indicate type of primer paint to be used and verify compatibility with field paint system specified.

PART 2–PRODUCTS

2.01 THERMALLY-INSULATED DOORS

- A. Thermally-insulated doors shall be hollow full flush, 1 3/4-inch-thick, 16 gauge steel sheet in accordance with ANSI/SD1-100 with polyurethane core rigid reinforcing full thickness.
- B. Acceptable products include the following, or equal:
 - 1. Ceko Imperial.
 - 2. Curries 707 Series.

2.02 FABRICATION–DOORS

- A. Doors shall be fully-sealed, continuously-welded construction with all surface welds, joints, and seams filled and ground smooth.
- B. Tops and bottoms of doors shall be completely closed with 16 gauge channels. Outside edges of doors shall be flush without depressions. No inverted channels will be allowed.
- C. Mortise, reinforce, drill, and tap doors to receive hardware. Reinforcement shall be welded within the stiles and rails. Reinforce top rails to accommodate closers on either side and reinforce bottom for kickplate.
- D. All Underwriters fire doors shall be constructed to meet Underwriters Laboratories specific approval according to current procedure for the indicated class.

- E. Glass in exterior doors shall be 1 inch thick.

2.03 FRAMES

- A. Steel door frames shall be made of 14 gauge, cold-rolled, prime-quality steel in accordance with ANSI/SD1-100.
- B. Frames shall be removable where shown on the Drawings.

2.04 FABRICATION–FRAMES

- A. Fabricate frames as welded unit. Weld joints continuously through full throat width of frames, including rabbets, soffits, and stops; grind, fill, dress, and make smooth, flush, and invisible.
- B. Welded frames shall be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and shall not be used to size the frame opening.
- C. Frames shall be 2 inches by 5 3/4 inches. Frames shall have 4-inch head member at 7 feet 0 inches doors in masonry walls.
- D. Fabricate frames with hardware reinforcement plates welded in place.
- E. Provide anchors appropriate to wall type.
- F. Provide frames for all steel doors.

2.05 FINISH

- A. Doors and frames shall receive one coat of rust-inhibitive, shop-applied primer paint. Primer paint must be compatible with field-paint system specified.
- B. Frames shall be finish-painted as specified in Section 09 91 00–Painting prior to installation. This includes back sides of door frames.

PART 3–EXECUTION

3.01 INSTALLATION–FRAMES

- A. Install frames in accordance with ANSI/SD1-100.
- B. Coordinate installation of frames with wall construction for anchor placement.
- C. Coordinate installation of frames with installation of doors, hardware, joint sealers, and field painting.
- D. Set all frames as supplied by manufacturer.
- E. Frames in masonry walls shall be grouted full.

3.02 INSTALLATION-DOORS

- A. Install doors in accordance with ANSI/SD1-100.
- B. Coordinate installation of doors with installation of frames, hardware, glass and glazing, and field painting.
- C. Set all doors as supplied by manufacturer. Hang all doors allowing for expansion and contraction at time of setting.
- D. Set all hardware in accordance with templates as supplied by hardware supplier.
- E. Cover all exposed hardware until completion of painting and finishing.
- F. Examine hardware at completion; test, oil, grease, and adjust as needed for smooth operation.

3.03 SCHEDULE

- A. See Door Schedule on the Drawings.

END OF SECTION

SECTION 08 22 10
FIBERGLASS DOORS AND FRAMES

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes:
 - 1. Fiberglass Doors.
 - 2. Fiberglass Frames for Nonrated Doors.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section. See Section 08 11 00–Standard Steel Doors and Frames.

1.02 WARRANTY

- A. Provide manufacturer's 20-year warranty against failure due to corrosion.

PART 2–PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable products include the following, or equal: CORRIM Company, Oshkosh, Wisconsin, or equal.

2.02 MATERIALS

- A. Resins:
 - 1. Manufacturer's formulation for corrosion-resistant resin system with light-stabilizing additives.
 - 2. Minimum glass fiber to resin ratio: 40%.
- B. Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings and stainless steel masonry tee anchors for new construction.
- C. Fasteners: Stainless steel.
- D. Glazing: Type specified in Section 08 81 00–Glazing; factory installed.

2.03 DOORS

- A. Thickness: 1 3/4 inches.
- B. Thermal Insulating Value: Minimum R value of 11.
- C. Construction:
 - 1. Core: Polyurethane foam for nonfire-rated doors.

2. Face Sheets: FRP molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 0.120 inch thick, minimum 15 mil gel-coated surface.
3. Stiles and rails shall be 1 1/2 inch square pultruded fiberglass tubes. Provide polymer blocking for all hardware reinforcing.

D. Door Edges: Smooth, seamless finish.

2.04 FIBERGLASS FRAMES

- A. Provide fiberglass frames for nonrated doors.
- B. Construction: One-piece pultruded fiberglass-reinforced plastic, minimum 1/4-inch wall thickness, jamb-to-head joints mitered and reinforced with FRP clips and stainless steel fasteners; providing for performance equivalent to 16 gauge steel frames.
- C. Frame Profile: 5 3/4 inches deep, 2 inches wide face; double-rabbeted with 5/8-inch-high stop. Provide 4-inch head frames in masonry openings.
- D. Finish: Gel-coat 15 mils thickness on all exposed surfaces. Color to match doors.

2.05 WINDOWS

- A. Stops: Pultruded fiberglass-reinforced plastic construction.
- B. Glazing: Specified in Section 08 81 00—Glazing.
- C. Sizes: Manufacturer's standards as indicated in Door Schedule.
- D. All fasteners shall be 316 stainless steel.

2.06 HARDWARE

- A. All doors and frames shall be mortised and reinforced with polymer blocking for all hardware in accordance with manufacturer.
- B. Remainder as specified in Section 08 71 00—Door Hardware and called for in Door Schedule.
- C. All fasteners shall be 316 stainless steel.

2.07 FINISH

- A. Doors shall have a 15 mil gel-coat finish. Finish for frames shall be as specified above.
- B. Color shall be a custom color selected by OWNER.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Set all doors and frames as supplied by manufacturer. Use stainless steel masonry anchors to support frame.
- B. Hang all doors allowing for expansion and contraction at time of setting.
- C. Set all hardware in accordance with templates as supplied by hardware supplier.
- D. Examine hardware at completion; test, oil, grease, and adjust as needed for smooth operation.
- E. Maintain plumb and level tolerances as specified in manufacturer's installation instructions.

3.02 SCHEDULE

- A. See Door Schedule on the Drawings.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes insulated overhead coiling door with electric operator, operating hardware, controls, and supports.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A653—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 REGULATORY REQUIREMENTS

- A. Conform to the 2021 International Building Code for motor and motor control requirements.
- B. Products requiring electrical connection shall be listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2—PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers include the following, or equal: Overhead Door Co. Series 625 Insulated Stormtite door, Raynor Series IF, or equal.

2.02 MATERIALS

- A. Curtain:
 - 1. Curtain slats shall be Type F-265I flat crown, pitch 2 5/8 inches, 22 gauge galvanized steel. Back cover shall be 24 gauge galvanized steel.
 - 2. Slat system shall be integral and foamed in place with polyurethane foam nominal 2-pound density applied between the slat and back cover, rising to bond the slat and back cover into an integral member with a thickness of 3/4 inch.
 - 3. End locks shall be used on alternate slats. Provide wind locks as required for 25 psf design wind load.
- B. Bottom Bar: The bottom bar shall be two galvanized steel angles, minimum thickness 1/8 inch, bolted back-to-back to reinforce the curtain in the guides, and have a loop-type weather seal.
- C. Guides:

1. Guides shall be three structural steel angles with a minimum thickness of 3/16 inch.
 2. Guides shall be equipped with full door height PVC weather seals contacting the exterior and interior curtain surfaces to minimize air flow.
 3. Guides shall be insulated full height and shall be equipped with wind lock bars to meet 25 psf design wind load.
- D. Brackets:
1. Brackets shall be minimum 3/16-inch-thick steel plate to support the barrel, counterbalance, and hood.
 2. Provide intermediate support brackets as necessary.
- E. Counterbalance:
1. Counterbalance shall be helical torsion springs housed in a steel pipe barrel, supporting the curtain with a deflection limited to 0.03 inch per foot of width.
 2. Counterbalance shall be adjustable by means of an external adjusting tension wheel and designed for minimum 20,000 cycles.
- F. Hood:
1. The hood shall be 24 gauge galvanized steel minimum.
 2. The hood shall have an internal baffle and an external lintel baffle to retard air infiltration.
- G. Locking: Manual chain hoist-operated doors shall have chain-keeper locks suitable for padlocking.
- H. Manual Operator: Chain hoist.
- I. Electric Components:
1. Electric operator shall be Model RHX by Overhead Door Corp., or equal. Operator shall be 3/4 horsepower, 480 volts, three-phase. Operator shall be equipped with quick-release equipment for manual operation in case of emergency or power failure.
 2. Provide one interior NEMA 12 3-button control station for each door, open/close/stop, 24-volt circuit.
 3. Provide one NEMA 4X exterior, surface-mounted, keyed open/close/stop control station for each door.
 4. Each door with electric operator shall have electric sensing edge to stop and reverse the door upon contacting an object while closing. Sensing edge shall be powered from the electric operator and monitored in accordance with UL 325:2010. Sensing edge shall be as manufactured by Miller Edge Model MGO20Y, with 25 feet of factory-provided cable, or equal.
 5. Each door with electric operator shall have infrared optoelectronic sensors mounted maximum 6 inches above the floor to stop and reverse the door upon sensing an object while closing. Provide manufacturer's mounting adapters. Sensors shall be powered from the electric operator and monitored in accordance with UL 325:2010. Sensors shall have visible LEDs to indicate power and proper alignment and shall utilize self-adjusting light intensity. Sensors shall be constructed of polypropylene and rated NEMA 4X. Sensors shall be as manufactured by Vitector Model OSE with 50 feet of factory-provided cable, or equal. Sensors shall be tested with the electric operator to comply with UL 325:2010.
 6. Interior operator and controls for doors as noted on schedule shall be NEMA 12. All devices and controls shall be provided by door manufacturer and be powered from control panel transformer(s) provided with the unit.

2.03 FINISHES

- A. The curtain and hood shall receive a UV-resistant powder-coat finish with color selected from manufacturer's standard colors.
- B. All nongalvanized, exposed ferrous surfaces shall receive one coat of manufacturer's standard factory-applied rust-inhibitive primer compatible with field paint.
- C. All nongalvanized, ferrous surfaces that will become inaccessible after installation shall be finish painted as specified in Section 09 91 00—Painting prior to installation.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Door shall be installed in accordance with manufacturer's instructions and standards by an authorized representative.
- B. Upon completion of installation, operating devices and controls shall be adjusted and lubricated to operate properly.

3.02 SCHEDULE

- A. See Door Schedule on the Drawings.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes exterior and interior extruded aluminum window frames and extruded aluminum sashes (for operable windows).
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. AAMA 101—Specifications for Aluminum Prime Windows and Sliding Glass Doors.
- B. ASTM E283—Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
- C. ASTM E330—Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. ASTM E331—Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- E. ASTM B221—Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- F. AAMA 611—Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

1.03 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand a minimum static air pressure difference of 90 psf for exterior windows and 60 psf for interior windows in accordance with ASTM E330.
- B. Limit member deflection to 1/175 with full recovery of glazing materials.
- C. System to accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.
- D. Limit air leakage through assembly to 0.10 cfm/min/sq ft of wall area measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E283.
- E. Water leakage: None when measured in accordance with ASTM E331 with a test pressure difference of 10 psf.

1.04 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 EXTERIOR WINDOWS

- A. Exterior window frames shall be 2-inch-deep extruded aluminum, in accordance with ASTM B221, with thermobreak.
- B. Acceptable products include the following, or equal:
 - 1. Kawneer Sealair 8225T Isolock, Fixed and Casement Windows.
 - 2. Oldcastle Signature Series 12P Fixed and Casement Windows.

2.02 INTERIOR WINDOWS

- A. Interior window frames shall be 2-inch-deep extruded aluminum in accordance with ASTM B221.
- B. Acceptable products include the following, or equal: Kawneer Sealair 7200 Series.

2.03 FABRICATION

- A. Aluminum extrusions shall be not less than 0.125 inch thick.
- B. All fabrication and erection fasteners shall be 18-8 stainless steel.
- C. Unless shown otherwise, provide 0.040-inch aluminum sill plates on exterior of window. Finish shall match window, sills, jamb, and head flashings where noted.
- D. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.
- E. Nominal window height and length for all windows shall be as shown in the schedule. CONTRACTOR shall measure all openings and coordinate sizes with window supplier.

2.04 FINISH

- A. Finish on all exposed aluminum shall be architectural class 1, anodic coating, conforming to AAMA 611. Color to be selected by OWNER.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Field verify wall opening sizes.

- B. Frames shall be securely attached to masonry as recommended by the window manufacturer.

3.02 SCHEDULE

- A. See Window Schedule on the Drawings.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Hardware to Fully Equip all Doors.
 - 2. Thresholds and Weatherstripping.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REGULATORY REQUIREMENTS

- A. Hardware shall conform to the 2021 International Building Code.
- B. Hardware for all buildings shall comply with barrier-free requirements.

PART 2–PRODUCTS

2.01 LOCKSETS AND LATCHSETS

- A. Mortise locksets and latchsets with stainless steel (ss) finish, as indicated in Paragraph 3.02 Schedule shall be Sargent mortise type Series 8200 line, Style L, Schlage L9000 Series, or equal.
- B. Locksets and latchsets without stainless steel (ss) finish shall be Sargent cylindrical type Series 10L, Schlage D Line, Best Access Systems 9K Series, or equal.
- C. Locksets and latchsets shall have 2 3/4-inch backset. Strikes shall be curved lip.
- D. Lockset and latchset numbers listed in Paragraph 3.02 Schedule are Sargent or Accurate (listed first) followed by Schlage or Schwepper number (listed second in parentheses).
- E. Provide removable core brass 6- or 7-pin cylinders for all locksets and latchsets.

2.02 EXIT DEVICES

- A. Exit devices shall be Sargent 8813 x ETL Series, or equal, and shall be equipped with reinforced cross bars and functions as indicated on the hardware sets. The exit device shall be operated by a lockable lever from the exterior side.

2.03 HINGES

- A. Butt hinges shall be Stanley FBB 191, Hager BB 1191, or equal, full mortise, ball bearing, nonferrous, nonremovable, and flat bottom tip, unless otherwise specified. Provide three 4 1/2-inch by 4 1/2-inch hinges per door for doors 7 feet or less in height with one additional

hinge for each additional 30 inches or fraction thereof, unless otherwise specified. Provide additional hinges or heavyweight hinges for all doors that are over 36 inches wide, unless specified otherwise.

2.04 DOOR CLOSERS

- A. Door closers shall be LCN Series 1460 for exterior doors and 1461 for interior doors, or equal. Provide aluminum finish on closers. Provide full covers. Door closers for locations noted as (ss) shall have the SRI primer for corrosion resistance. Door closers specified in Paragraph 3.02 are LCN. (H-Hold Open).

2.05 OVERHEAD DOOR HOLDERS

- A. Overhead door holders shall be Glynn Johnson GJ 81H Series, or equal, unless otherwise specified. Holders for locations noted as (ss) shall be fabricated with stainless steel components. Numbers specified in Paragraph 3.02 are Glynn Johnson.

2.06 SURFACE BOLTS

- A. Surface bolts shall be 8-inch Ives 1630 series, or equal. At doors with (ss) hardware, bolts shall be 8-inch Ives 1640 Series, or equal.

2.07 KICKPLATES

- A. Kickplates shall be Rockwood, or equal, 6 inches high. Kickplate width shall be 2 inches less than door width.

2.08 DOOR STOPS

- A. Provide wall- or floor-mounted door stops at all interior doors. Stops shall be Glynn Johnson GJFB-13, GJ60C, or GJ60W for locations noted as (ss), or equal.

2.09 THRESHOLD AND WEATHERSTRIPPING

- A. All exterior doors shall be weatherstripped with Reese DS75, National Guard Products, Inc. 156, or equal, weatherstripping. Provide Reese 323C, Pemko 315AN, or equal, sweeps; and Reese S425A, Pemko 171A (provide Reese S439A, Pemko 273A, for areas with thicker flooring on one side), or equal, thresholds. Interior Door No. 1505B shall be weatherstripped and have sweeps and thresholds as specified for exterior doors. Exterior doors without mullion shall have Reese No. 87, Pemko 352A, or equal, positive sealing astragal.

2.10 KEYING

- A. Door keys shall be keyed to match existing facilities. Provide two keys per lock. Doors shall have temporary construction cylinders. Provide permanent cylinders at project completion.

2.11 LATCH PROTECTION PLATE

- A. Latch protection plate shall be 3 inches by 11 inches for use with cylindrical locksets with a 2 3/4-inch backset. Protection plate shall be steel with finish to match door hardware, Hager 341D, DonJo MLP211, or equal.

2.12 ELECTRIC STRIKE

- A. Electric strike shall be Von Duprin Model 6211 for standard cylindrical locks, and Model 6112 for exit devices, or equal. Provide with 12-volt DC continuous operation.

2.13 FINISH

- A. Finish for all hardware, except as noted below, shall be US 26D or US 32D where stainless steel (ss) hardware is specified in Paragraph 3.02.
- B. Finish for surface bolts shall be US 26D; finish for kickplates shall be 32D.
- C. Where stainless steel (ss) is specified, all hardware, including threshold and weatherstripping, shall be installed with stainless steel fasteners.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Provide finish hardware to fully equip all doors.
- B. Install hardware in accordance with manufacturer's instructions.

3.02 SCHEDULE

- A. Provide the following hardware groups in the amounts indicated on the door schedule or required for a complete and proper installation:

Group 1

Lockset-10XG04
Door Closer-1460
(Parallel Arm)
Hinges and Kickplate
Electric Strike
Latch Protection Plate

Group 2

Exit Device-8813 x ETL (ss)
Door Closer-1460 (ss)
(Parallel Arm)
Hinges and Kickplate (ss)
Latch Protection Plate (ss)

Group 3

Lever-Rigid, each face
Surface bolts-One top and bottom
Overhead Door Holder GJ 81 H-HD
Hinges and Kickplate Latch Protection Plate

Group 4

Lever–Rigid, each face (ss)
Surface bolts–One top and bottom (ss)
Overhead Door Holder GJ 81 H–HD (ss)
Hinges and Kickplate (ss)
Electric Strike (ss)

Group 5

Latchset 10XU15 (ND10S)
Door Closer–1460 BF (Regular Arm)
Hinges and Kickplate

Group 6

Lockset 10XU65 (ND40S)
Hinges and Kickplate

Group 7

Exit Device 8813
Door Closer–1460 BF (Regular arm)
Hinges and Kickplates

END OF SECTION

SECTION 08 81 00

GLAZING

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes glass and glazing for windows and door lites.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. GANA—Glass Association of North America.

1.03 WARRANTY

- A. Exterior insulating glass shall be provided with a 10-year warranty against failure of the seal.
- B. Coated glass shall be provided with a 10-year warranty against peeling, cracking, or deterioration of the coating.

PART 2—PRODUCTS

2.01 EXTERIOR GLASS

- A. Glass in exterior metal windows and exterior door lites shall be 1-inch-thick insulating glass consisting of two pieces of 1/4-inch float glass separated by a 1/2-inch air space.
- B. Acceptable manufacturers include the following, or equal: Oldcastle Glass Company, PPG Solarban 70XL.
- C. Glass shall be Low-E with clear tint outboard lite and clear tint inboard lite with the following maximum values, or equal.

	Shading Coefficient	U-Value		SHGC
		Winter	Summer	
Clear	.32	.28	.26	.27

- D. Exterior windows adjacent to doors and exterior door lites shall have tempered glass in compliance with the governing building code.

2.02 INTERIOR GLASS

- A. Glass in interior windows and interior door lites, except as noted, shall be 1/4-inch-thick float glass, fully tempered.

- B. Acceptable manufacturers include the following, or equal: Oldcastle Glass Company, PPG.

2.03 GLAZING COMPOUNDS AND ACCESSORIES

- A. Glazing system shall consist of a polyisobutylene-butyl tape, liquid polymer sealant, and vinyl roll-in strip.
- B. Acceptable products include the following, or equal:
 - 1. Tremco Vision Strip System.
 - 2. General Electric Silglaze.

2.04 FABRICATION

- A. Glazing of windows shall be from the interior.
- B. Accessories such as setting blocks, clips, etc., shall be provided to properly set glass.
- C. Obtain sizes from work at the site or from the manufacturer of work into which the materials will be set. Responsibility for the correctness of measurements shall be assumed by CONTRACTOR.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Comply with “Glazing Manual” by Glass Association of North America (GANA), except as specifically recommended otherwise by manufacturers of the glass and glazing materials.
- B. Completed installation shall be water- and airtight.

END OF SECTION

SECTION 09 22 16
METAL STUD FRAMING SYSTEM

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes metal studs, furring channels, and accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM C754–Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
- B. ASTM C840–Standard Specification for Application and Finishing of Gypsum Board.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers include the following, or equal:
 - 1. Dietrich Industries, Inc.
 - 2. Clark Western.
 - 3. UNIMAST Incorporated.
 - 4. Marino/WARE.

2.02 MATERIALS

- A. Metal studs shall be 25 gauge, galvanized, except as otherwise shown or specified; channel shaped and punched for utility access. Depth as shown on the Drawings; 3 1/2 inches minimum if size not shown.
- B. Top and bottom runners shall be of same material and thickness as studs with 1 1/4-inch leg.
- C. Provide fasteners, 20 gauge sheet metal backing, and other accessories for a complete installation.
- D. Furring channels shall be 25 gauge, galvanized, except as otherwise shown or specified. Depth and configuration shall be as shown on the Drawings.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install metal framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.
- B. Provide supplementary framing, blocking, and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with *Gypsum Construction Handbook* published by United States Gypsum Company.
- C. Framing shall be with studs and runners of depth shown or required.
- D. Provide continuous floor and ceiling runner tracks sized to match stud depth. Align runner tracks accurately to the partition layout at both sill and head. Secure runner tracks as recommended by the stud manufacturer for the sill and head construction involved, except do not exceed 24 inches on center spacing for nail- or power-driven fasteners or 16 inches on center for other types of attachment. Provide fasteners at all corners and ends of runner tracks.
- E. Erect studs from floor up to structural deck above and space 16 inches on center maximum, unless shown otherwise.
- F. Align stud web openings horizontally.
- G. Friction fit studs to runner tracks by positioning and rotating into place. Provide positive attachment to runner tracks for studs located at partition corners and intersections and adjacent to openings using 3/8-inch self-tapping screws or stud-clinching tool on both flanges of studs. Do not weld.
- H. Provide additional studs to support inside corners at partition intersections and corners and to support outside corners, terminations of partitions, both sides of expansion and control joints, and adjacent to all openings. Brace stud framing system rigid.
- I. Install full-length studs between runner tracks wherever possible. If necessary, splice studs by nesting with a minimum lap of 8 inches and fasten lap with two screws through each flange.
- J. Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above. Where partitions abut ceiling or deck construction or vertical structural elements, provide slip- or cushion-type joint between partition and structure to prevent transfer of loading imposed by structural movement to partitions.
- K. Frame drops, ceilings, and soffits for gypsum wallboard with studs, channels, or suspension system to support 20 psf superimposed load. Do not exceed 24-inch spacing for components to which gypsum wallboard is attached. Install miscellaneous braces and supports to maintain rigidity with structure. Minimum stud gauge is 20. Frame chases in similar manner as partitions.

- L. Install flat plate to underside of metal deck to provide support for runner tracks parallel to deck flutes.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes gypsum wallboard, accessories, and texture finish.
- B. Related Sections: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM C475—Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- B. ASTM C840—Standard Specification for Application and Finishing of Gypsum Board.
- C. ASTM C1396—Standard Specification for Gypsum Board.
- D. ASTM E119—Standard Test Methods for Fire Tests of Building Construction and Materials.
- E. ASTM C473—Standard Test Methods for Physical Testing of Gypsum Panel Products.
- F. ASTM C1177—Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- G. GA-214—Gypsum Association's Levels of Finish for Gypsum Panel Products.

1.03 REGULATORY REQUIREMENTS

- A. Conform to the 2021 International Building Code.

1.04 ENVIRONMENTAL CONDITIONS

- A. Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.
- B. For nonadhesive attachment of gypsum board to framing, maintain not less than 40°F. For adhesive attachment and finishing of gypsum board, maintain temperature uniformly within the range of 55°F to 70°F for 48 hours prior to application and continuously thereafter until drying is complete.
- C. Ventilate building spaces to remove moisture not required for drying joint treatment materials. Avoid drafts during dry hot weather to prevent materials from drying too rapidly.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers include the following, or equal:
 - 1. United States Gypsum Company (USG).
 - 2. Gold Bond Building Products, LLC, Division of National Gypsum Company.

2.02 MATERIALS

- A. Gypsum Wallboard-Interior Sheathing:
 - 1. Provide gypsum board conforming to ASTM C1396, in maximum lengths available to minimize end-to-end joints.
 - 2. Gypsum shall be 5/8-inch-thick by 48-inch-wide USG Sheetrock Brand EcoSmart Firecode X Gypsum Panels, Gold Bond EVOLVE X Gypsum Wallboard, or equal, with tapered edge.
- B. Accessories:
 - 1. Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.
 - 2. Reinforcement at exterior corners shall be USG Galvanized Sheetrock Brand Paper-Faced, Metal Corner Bead, Clarkdietrich Galvanized Metal Corner Bead, or equal. Provide Clarkdietrich vinyl cornerbead at restrooms and other locations of high moisture content.
 - 3. Reinforcement at internal corners shall be USG Sheetrock Brand Flexible Metal Tape-on Corner Bead, Clarkdietrich Strait-Flex Tape, or equal.
 - 4. Provide trim accessories as required.
 - 5. Provide case beads and other accessories as detailed or required.
 - 6. Joint compound shall be USG Durabond 90, ProForm Quickset 90, or equal, at cased edge joints.
- C. Finish Materials: Interior textured finish shall be USG Spray Texture Finish; Gold Bond Spray Quick, medium-fine finish, or equal.

PART 3–EXECUTION

3.01 EXAMINATION

- A. Examine substrate to receive gypsum wallboard systems for alignment, support, bracing, etc., prior to installation. Shim, block as required to comply with tolerances.
- B. Verify that the installation of all blocking, mechanical, and electrical work is completed.

3.02 INSTALLATION

- A. Install and finish gypsum board to comply with ASTM C840.
- B. Direct Attachment:

1. All ends and edges of sheetrock shall occur over nailing members except when joints are at right angles to framing members.
 2. All wallboards shall be applied horizontally. All ends and edges shall fit neatly. End joints shall be staggered. Joints on opposite sides of a partition shall be arranged to occur on different studs.
 3. Sheetrock shall be applied to studs by power-driven 1 1/4-inch Type W screws, spacing not to exceed 12 inches on center.
 4. Fasteners shall be at least 3/8 inch from edges.
- C. Cut openings required for ducts, piping, etc., above ceiling or fit panels after installation.
- D. Provide edge trim at all exposed edges of board and where board abuts dissimilar material. No raw drywall shall abut another material without a bead.
- E. Provide control joints at locations indicated or, if not indicated, at spacings and locations required by referenced gypsum board application and finish standard to prevent cracking of finished drywall.

3.03 DRYWALL LEVEL OF FINISH

- A. Drywall level of finish shall be performed in accordance with Gypsum Association's GA-214 Levels of Finish for Gypsum Panel Products.
- B. See Room Finish Schedule for level of finish required in each room containing gypsum board. Minimum finish shall be level 4 unless noted otherwise.

Drywall Level of Finish	Description	Typical Locations
0	No taping, finishing or other accessories are required.	Temporary Construction
1	Joints and interior angles shall have tape embedded in joint compound. Excess joint compound, tool marks, and exposed fastener heads acceptable.	Rooms/areas not open to public view.
2	Joints and interior angles shall have tape embedded in joint compound and covered with thin coating of joint compound with joint knife. Fastener heads and accessories covered with one coat of joint compound. Tool marks and acceptable. Surface shall be free of excess joint compound.	Garages, Warehouses, Storage (Surface appearance not a concern)
3	One separate coat of joint compound over all joints and interior angles. Fastener heads and accessories covered with two coats of joint compound. Surface shall be smooth and free of tool marks.	Rooms/Areas receiving medium or heavy texture finishes or areas receiving commercial grade wall coverings.
4	Two separate coats of joint compound shall be applied over all flat joints and one separate coat over interior angles. Fastener heads and accessories covered with three separate coats of joint compound. Surface shall be smooth and free of tool marks.	Offices/Administrative areas with smooth wall designs or light textures.

3.04 TEXTURE FINISH

- A. All sheetrock shall be sprayed with a single coat of texture finish.
- B. Apply finish to an area of approximately 200 square feet and obtain OWNER's approval. Approved area shall establish standard for all the work.
- C. Protect adjacent surfaces from texture droppings or overspray.
- D. The spray shall be uniform and free from application patterns.
- E. The spray equipment shall be of such a size and type to provide acceptable results.
- F. Apply at a minimum rate of 200 square feet per gallon.

END OF SECTION

SECTION 09 51 00
SUSPENDED ACOUSTICAL CEILINGS

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes normal acoustical ceilings, and suspended grid system.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM C423–Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.
- B. Submit samples for ENGINEER's review before installation.

1.04 EXTRA MATERIAL

- A. Provide an extra package of each type of ceiling tile used.

PART 2–PRODUCTS

2.01 SUSPENSION SYSTEM

- A. Suspension system for normal acoustical ceilings shall be rolled-steel exposed grid system with white aluminum bottom trim, PRELUDE ML 15/16 inch by Armstrong, or equal. Anchor suspension systems to precast plank with galvanized steel hanger wire.
- B. The suspension system shall support the ceiling assembly with a maximum deflection of 1/360 of the span.

2.02 NORMAL ACOUSTICAL CEILINGS

- A. Unless otherwise specified, acoustical ceiling material in rooms with suspended ceilings shall be Cortega Tegular as manufactured by Armstrong, or equal. Finish shall be 24 inches by 24 inches by 5/8 inch thick. Edge shall be Angled Tegular.

2.03 MOISTURE-RESISTANT CEILINGS

- A. Ceiling in toilet and shower rooms shall be Grindstone Gypsum Ceiling Panels by Armstrong, or equal. Finish size shall be 24 inches by 24 inches and 1/2 inch thick.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Coordinate grid layouts with building electrical plan sheets.
- B. The systems shall be installed to permit border units of the greatest possible size.
- C. All members shall be aligned for true, level surface, and straight lines.
- D. Metal moldings shall be provided at the perimeter of the ceiling, at the face of beams, and at all openings.
- E. Where conduits, pipes, or ductwork penetrate ceiling, they shall be banded by properly supported ceiling grid.
- F. Cut recess into edge of field cut panels to match full-size panels where recessed edges are provided.

3.02 CLEANING AND ADJUSTING

- A. Remove and replace units which are damaged or improperly installed.
- B. Following installation, clean soiled or discolored surfaces of units.

3.03 SCHEDULE

- A. Acoustical ceiling board and grid system suspended from ceilings shall be provided in rooms indicated on the Finish Schedule on the Drawings.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Surface preparation and application of paints and coatings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. AMPP—Association for Materials Protection and Performance.
- B. ASTM B117—Standard Practice for Operating Salt Spray (Fog) Apparatus.
- C. ASTM D2247—Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- D. ASTM D3363—Standard Test Method for Film Hardness by Pencil Test.
- E. ASTM D4060—Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- F. ASTM D4541—Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- G. ASTM D4585—Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
- H. Federal Register—Code of Federal Regulations (CFR).
- I. Federal Register—Resource Conservation and Recovery Act (RCRA).
- J. Federal Register—Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
- K. ICRI—International Concrete Repair Institute.
- L. NACE—National Association of Corrosion Engineers.
- M. SSPC—The Society for Protective Coatings—Steel Structures Painting Manual.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

- C. Submit manufacturer's Safety Data Sheets (SDS) for each type of paint with each shop drawing submittal. SDS sheets shall be posted at the construction site at all times painting is in progress.
- D. Substitution submittals shall include performance test data, as certified by a qualified testing laboratory, for the ASTM tests specified in Paragraph 2.01.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. All paints, surface preparation, and application methods shall conform to federal requirements for allowable exposure to lead and other hazardous substances.
 - 2. All paints shall be NSF Standard 61/600-approved when they are in contact with potable water or within potable water reservoirs.
- B. Prepainting Meeting:
 - 1. A prepainting meeting shall be held immediately following the project preconstruction conference. The prepainting meeting is to be held prior to any material and equipment that requires painting is delivered to the site.
 - 2. CONTRACTOR, the paint subcontractor, and the paint manufacturer's representative shall be present to review the specifications and project scope.
 - 3. The paint manufacturer's representative shall review progress at the site as requested by ENGINEER. These are generally expected to be prior to monthly progress meetings.

1.05 FIELD QUALITY CONTROL

- A. Furnish testing apparatus as applicable for observing surface preparation, testing atmospheric conditions and testing coatings, prior to beginning surface preparation. Provide the following apparatus:
 - 1. One set of U.S. Department of Commerce thickness calibration plates, certified by the National Bureau of Standards, to test dry film thickness.
 - 2. One wet-film thickness gauge.
 - 3. One dry-film thickness gauge, Mikrotest III, 0 to 40 mils with calibration standard approved by the Bureau of Standards.
 - 4. One Bacharach Sling Psychrometer, Model 12-7011.
 - 5. Tinker and Razor Model M-1 Holiday Detector and recommended wetting agent.
 - 6. One set of SSPC-VIS 1-89 Visual Standards for Abrasive Blast Cleaned Steel.
- B. Provide access via scaffolding or staging for inspection.
- C. Entire surface of coated submerged concrete shall be tested with holiday detector. Mark and repair all pinholes, then retest until no pinholes are found.
- D. CONTRACTOR shall provide documentation to ENGINEER of conditions before and during painting operations for each area and each day's work. Documented conditions shall include the following at a minimum: date, area of work, system used, preparation methods, environmental conditions, quantity and thickness of coating placed, noted conditions, and nonconforming items. ENGINEER can provide sample report form if CONTRACTOR does not have their own.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.
- B. Drop cloths shall be used in all areas where painting is done to fully protect other surfaces.
- C. Oily rags and waste must be removed from the building each night or kept in an appropriate metal container.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. CONTRACTOR shall dry-heat, dehumidify, and ventilate to obtain painting conditions recommended by the paint manufacturer during surface preparation, application, and cure.
- B. Relative humidity conditions as specified by the paint manufacturer's data sheet shall be adhered to. This includes times in which supplemental heat is used. Supplemental heat shall be indirect-fired hot air furnaces or electric heat. Open-flame heaters shall not be used.
- C. No unprotected, unheated exterior painting shall be undertaken when damp weather appears probable, nor when the temperature of the substrate is below 55°F, unless approval in writing is received from the paint manufacturer.

1.08 COLOR SELECTIONS

- A. Provide color charts for all coatings being used on the project. After initial selection of colors by OWNER, provide draw down samples of selected colors for OWNER's final approval. For stained wood, provide specified wood species sample with selected color for final approval.
- B. CONTRACTOR shall provide a summary sheet at the completion of the project listing the finish paint products used and the manufacturer's color identification for each item painted. This summary sheet should be submitted to ENGINEER and OWNER for review.

PART 2—PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc., Sherwin-Williams Company, Carboline, PPG Protective and Marine Coatings, or equal, unless noted otherwise in the schedule.
- B. Where thinning is necessary, only the products of the manufacturer furnishing the paint will be allowed. All such thinning shall be done strictly in accordance with the manufacturer's instructions.
- C. Paint and paint products of Tnemec Company and Sherwin-Williams, listed in the following specifications, are set up as standard of quality. Carboline and PPG Protective and Marine Coatings have preapproved equivalent products that shall be used. Other manufacturer's products will be considered as a substitution if CONTRACTOR and paint manufacturer certify that the products offered are recommended for the service intended, are compatible with the shop primers used, are equal in solids content and composition, and are of the same

type. Submittal shall include the following performance data as certified by a qualified testing laboratory. ASTM Specifications shall be the latest revision:

1. Abrasion–ASTM D4060, CS-17 Wheel, 1,000 grams load.
2. Adhesion–ASTM D4541.
3. Hardness–ASTM D3363.
4. Humidity–ASTM D2247 and D4585.
5. Salt (Fog) Spray–ASTM B117.

PART 3–EXECUTION

3.01 SURFACE PREPARATION

A. General:

1. All surfaces to be painted shall be prepared as specified herein and by the manufacturer's published data sheet and label directions. The objective shall be to obtain a uniform, clean, and dry surface.
2. No field painting shall be done before the prepared surfaces are observed by ENGINEER. Surfaces painted without such observation shall be abrasive-blast-cleaned and repainted.
3. Prior to field-blasting, a sample of the blast abrasive shall be provided to ENGINEER for pH testing. Additional samples of subsequent deliveries or batches of blast abrasive shall be provided to ENGINEER for pH testing.
4. For on-site abrasive-blasting, low-dust, low-silica content material shall be used. Coal slag abrasive shall be used on pipe and ferrous materials. Staurolite abrasive shall be used on concrete and concrete block.
5. Quality of surface preparations listed below are considered a minimum. If paint manufacturer requires a better preparation for a particular application, it shall be considered a requirement of this specification.
6. All concrete surfaces shall be tested for moisture in accordance with ASTM D4263 and, if necessary, F1869. Surfaces shall also be verified that the pH of the cleaned concrete surface to be coated is within the range of 8 to 11.

B. Ferrous Metal:

1. All ferrous metal to be primed in the shop shall have all rust, dust, and mill scale, as well as all other foreign substances, removed by abrasive blasting. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. All ferrous metals not primed in the shop shall be abrasive-blasted in the field prior to application of the primer, pretreatment, or paint.
3. Abrasive blasting of metals in the shop shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for immersion service shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for nonimmersion service shall be in accordance with SSPC-SP6 Commercial Blast Cleaning.
4. Solvent cleaning in accordance with SSPC-SP1 shall precede all abrasive-blasting operations.
5. Ductile iron pipe shall be prepared by abrasive blasting per National Association of Pipe Fabricators NAPF 500-03-04 Abrasive Blast Cleaning.
6. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

- C. Concrete:
1. All concrete surfaces, including precast concrete to be painted, shall be cleaned of all form oil, curing compound, and other foreign matter. Concrete floors containing oil and grease residues shall be cleaned with detergent to remove all residues.
 2. All new concrete and precast concrete walls, floors, and ceilings shall be abrasive-blast cleaned in accordance with SSPC-SP13/NACE No. 6 in order to prepare the surfaces for adherence of the painting systems as specified. Abrasive blasting of concrete shall result in a surface profile in accordance with ICRI No. 03732 at CSP-3 to CSP-5.
 3. Bug holes, pits, voids, and cracks shall be filled as specified in Section 03 30 00—Cast-In-Place Concrete without placing a friable sand-cement surface overall. The dried surface shall be stoned down.
 4. Paint manufacturer shall observe and approve the surface preparation method and the prepared surface prior to painting.
 5. After cleaning, the surface shall be washed and all dust, sand, and loose particles shall be removed by vacuuming. If CONTRACTOR elects to blow the surfaces off with air, it shall be oil-free air, and the methods shall conform to OSHA requirements.
- D. Galvanized: Where galvanized items are not submerged or buried, they shall be cleaned with nonhydrocarbon solvent cleaner (such as Clean N Etch, or equal) in accordance with SSPC-SP1 and shall be abrasive-blasted in accordance with SSPC-SP16 Brush-Off Blast Cleaning.
- E. Copper: Where copper piping is not submerged or buried, it shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.
- F. PVC and CPVC: All PVC and CPVC to be painted shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.
- G. Aluminum: Where listed in the Schedule to be painted, it shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.

3.02 APPLICATION

- A. All materials shall be used as specified by the manufacturer's published data sheets and label directions.
- B. No paint shall be applied on a wet or damp surface and in no case until the preceding coat is dry and hard. Each coat shall be allowed to dry in accordance with manufacturer's data sheets before the next coat is applied.
- C. Drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, other drying times will be necessary.
- D. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry and cured.
- E. Steel that will be inaccessible in the completed work shall receive the final coat before enclosure.
- F. Paint shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Tops and bottoms of walls and areas

that are “cut-in” by brush prior to rolling shall have a uniform appearance in comparison with adjoining surfaces.

- G. Concrete block walls shall be back-rolled to achieve a pinhole-free surface coat.
- H. Walls and ceiling surfaces shall receive a minimum of one coat of paint before surface-mounted items such as conduits, boxes, piping, etc., are installed on these surfaces.
- I. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of the first field coat of primer or intermediate coat. This includes, but is not limited to, between pipe flanges, pipe flange/pipe barrel joints, equipment fittings, and other narrow openings.
- J. No paint shall be applied to new or existing surfaces until joints have been caulked according to Section 07 90 00—Caulking and Sealants requirements, except at moving joints which shall be finish-painted before caulking or caulking shall be protected during painting.
- K. For PVC and CPVC piping, unions and valves shall not be painted.
- L. No field coating of paint shall be applied to ductile iron piping until the piping has been tested, the pipe gaps or joints have been caulked, and the caulk has fully cured, as specified in Section 40 05 00—Piping Appurtenances.

3.03 FIELD QUALITY CONTROL

- A. Examination of work on the site by the manufacturer’s representative shall be performed when requested by ENGINEER.

3.04 CLEANING

- A. All stains and marks shall be removed from other surfaces upon completion of the work.

3.05 SCHEDULE

- A. General:
 - 1. At the completion of the project, all painted surfaces which have been damaged shall be repainted or touched-up.
 - 2. See Finish Schedule on the Drawings for an additional reference for areas to be painted.
 - 3. The painter shall use some discretion in what should and should not be painted. Do not paint over labels and other information, bronze, machined surfaces, moving parts where painting may impair movement, hot surfaces which may peel, etc. If in doubt whether a part should be painted, ask ENGINEER.
 - 4. Products listed first are Themec and second are Sherwin-Williams.
- B. New Work:
 - 1. All new work done by all trades shall be painted by CONTRACTOR in accordance with the following schedule and in accordance with paint manufacturer’s recommendation. It is the intent of these specifications that all non-galvanized ferrous metal items scheduled for painting be shop-primed. If items are not shop-coated, surfaces shall be prepared and painted in the field as specified. If any items of new construction are not listed, CONTRACTOR shall request paint system from ENGINEER, and the items shall be painted as part of this Contract without additional cost. See Section 03 30 00—Cast-In-Place Concrete for sealed concrete floors.

2. Interior concrete block walls and concrete walls: One filler coat of Epoxoblock WB 1254, Kem Cati-Coat HS, and two coats Series N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure.

Note: Paint shall be roller- or brush-applied to concrete sound-absorptive block.

3. Interior concrete walls:
 - a. One filler coat (1/16-inch minimum thickness) Mortarclad 218, Duraplate 2300.
 - b. Two coats of Series N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure.

Note: Interior face of concrete tank walls and floors channels and pipe trenches are not to be painted.

4. All exposed concrete ceilings (ceilings of water-containing tanks are not considered exposed): Two coats of Series N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure.
5. Cast or ductile iron; not submerged or buried (including pipes to be insulated):
 - a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Fast Cure Beige as primer;
 - b. Touch-up prime coat prior to finish coating; and apply either:
 - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure for interior surfaces, or
 - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure, and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
6. Cast or ductile iron, tar coated; buried: Not painted.
7. Cast or ductile iron, submerged:
 - a. One shop coat Series 1 Omnithane (N69-1255 Epoxoline), Dura-Plate 235 Beige as primer.
 - b. Touch-up prime coat prior to finish coating and one stripe coat on all edges of N69 Epoxoline, Dura-Plate 235.
 - c. Two coats of Series N69-Hi-Build Epoxoline II, (one coat) Sher-Glass FF.
 - d. For areas in contact with potable water:
 - (1) Tnemec Products:
 - (a) One shop coat of Series 94-H20 as primer.
 - (b) One intermediate stripe coat on all weld seams of Series 21.
 - (c) One finish coat of Series 21 (tank white).
 - (2) Sherwin-Williams Products:
 - (a) One shop coat of Corothane I Galvapak 1K, as primer.
 - (b) One intermediate stripe coat on all weld seams of Macropoxy 5500LT (beige).
 - (c) Two finish coats of Sherplate 600 (white).
8. Steel, machinery, and equipment; not submerged (including pipes to be insulated):
 - a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Fast Cure Beige as primer.
 - b. Touch-up primer prior to finish coat, and either:
 - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure for interior surfaces; or
 - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure; and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.

FIRST FIELD COAT SHALL BE APPLIED PRIOR TO INSTALLATION TO SURFACES INACCESSIBLE AFTER INSTALLATION INCLUDING BACK SIDES OF DOOR FRAMES. SEE DIVISION 08 FOR FACTORY-APPLIED DOOR PRIMERS.

9. Motors, gear drives, and doors delivered with nonepoxy primers:
 - a. Degrease per SSPC-SP1.
 - b. Lightly hand-sand per SSPC-SP2.
 - c. Apply one coat 135-1255 Chembuild Beige, Macropoxy 646 Fast Cure Beige.
 - d. Apply two finish coats as follows:
 - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure for interior surfaces, or
 - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure, and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
10. Steel, machinery, and equipment, submerged:
 - a. One shop coat Series 1 Omnithane (N69-1255 Epoxoline), Dura-Plate 235 Beige as primer.
 - b. Touch-up prime coat prior to finish coating, and one stripe coat on all edges of N69 Hi-Build Epoxoline, Dura-Plate 235.
 - c. Two coats of N69 Hi-Build Epoxoline, (one coat) Sher-Glass FF.
 - d. For areas in contact with potable water:
 - (1) Tnemec Products:
 - (a) Primer or shop coat shall be Series 94-H20.
 - (b) Stripe coat shall be Series 21.
 - (c) Finish coat shall be Series 21 (tank white).
 - (2) Sherwin-Williams Products:
 - (a) Primer or shop coat shall be Corothane I Galvapac 1K.
 - (b) Stripe coat shall be Macropoxy 5500LT (beige).
 - (c) Intermediate Coat shall be Sherplate 600 (beige).
 - (d) Finish coat shall be Sherplate 600 (white).
11. Galvanized, copper, brass, CPVC, and PVC; not submerged or buried:
 - a. Two coats of N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure for interior surfaces, or
 - b. One coat of N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure, and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
 - c. For galvanized items that are embedded in construction, provide one coat before installing.
12. Insulation of equipment, pipes, and ductwork:
 - a. Two coats of Series 1029 Endurotone, DTM Acrylic.
 - b. Colored PVC jacketing shall not be painted.
13. Galvanized, copper, CPVC, and PVC; submerged or buried: Not painted.
14. Aluminum items:
 - a. Exposed areas of structural items such as railings and grating shall not be painted.
 - b. For structural items in contact with concrete, see Division 05.
15. High temperature coatings (250°F to 500°F for steel and ductile iron piping and accessories):
 - a. One prime coat of Sherwin Williams Heat-Flex® Hi-Temp 500 (2.0 to 3.0 DFT).
 - b. One finish coat of Sherwin Williams Heat-Flex® Hi-Temp 500 (2.0 to 3.0 DFT).
16. Drywall:
 - a. Sherwin-Williams products.
 - b. One coat of ProMar 200 Interior Latex Wall Primer, B28W8200.
 - c. Two coats of ProMar 200 Latex Eg-Shel Enamel.
17. Stainless steel: Not painted.

18. Steel and Ductile Iron Insulated Coating Systems:

- a. Tnemec Products:
 - (1) Primer coat shall be Tnemec Series 94-H20 Hydro Zinc.
 - (2) Two intermediate coats shall be Tnemec Series 971 Aerolon.
 - (3) Finish coat shall be Tnemec Series 1028T Enduratone HDP.
- b. Sherwin Williams Products:
 - (1) Primer coat shall be Corothane I Galvapak 1K.
 - (2) Five Intermediate Coats shall be Heat-Flex® Hi-Temp 3500.
 - (3) Two finish coats shall be Shercryl HPA.
- c. All finish colors selected by OWNER.
- d. If equipment to be coated does not have a zinc-rich shop primer coating option, CONTRACTOR shall either surface prepare area as necessary or provide manufacturer recommended tie-coat.

C. Coverage:

1. Dry mil thickness shall conform to those specified. Mil test measurement shall conform to SSPC Steel Structures Painting Manual. Dry Film Thickness (DFT) shall be verified in accordance with SSPC-PA2.
2. The coatings listed will provide the mil thickness given when applied at the coverages listed. Upon the request of ENGINEER, such surfaces shall be checked by the painter with a calibrated mil thickness gauge and any deficiencies found in the film shall be remedied by additional coat(s) at the expense of CONTRACTOR.
3. On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative pinhole-free finish either by decreasing the coverage rate or by applying additional coats of paint.
4. Coverages reflect manufacturer's recommendations using spray application techniques. Where brushing or rolling is specified or performed at the discretion of the painter, one additional coat, minimum, will be required to achieve total DFT as specified and recommended by the manufacturer.

	Min. Sq. Ft.** Coverage	Min. Dry Mil** Thickness Per Coat
Products		
1029 Endurotone, DTM Acrylic	200	
N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure		
Steel or Impervious Substrate Primer Coat	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish coat	---	5.0
135-1255 Chembuild, Macropoxy 646 Fast Cure	335	4.0
Steel Doors	---	3.0
20HS Pota-Pox, Macropoxy 646 Fast Cure		
Steel or Impervious Substrate Primer	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish Coat	---	5.0
1094 Endura-Shield II, Acrolon 218HS	---	2.5
201 Epoxoprime, ArmorSeal 1000 HS Epoxy	250	
280 Tneme-Glaze, ArmorSeal 1000 HS Epoxy	250	
Epoxoblock WB 1254, Kem Cati-Coat HS	80	
N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure (Masonry and Concrete)	250	
Series 1 Omnithane, DuraPlate 235 (Primer)		3.0, 5.0

	Min. Sq. Ft.** Coverage	Min. Dry Mil** Thickness Per Coat
N69 Hi-Build Epoxoline II (Submerged)		6.0
Sher-Glass FF (Submerged)		12.0
Macropoxy 5500 LT (potable water system)		
Stripe Coat	---	5.0
Tnemec Series 94-H20, Sherwin Williams Corothane I Galvapak 1k		
Potable Water System Primer	---	3.0
Insulating Coating System Primer	---	3.0
Tnemec Series 21,		
Potable Water Stripe and Finish Coat	---	12.0
Sherwin Williams SherPlate 600		
Potable Water Intermediate and Finish Coats	---	6.0
Tnemec Series 1224 Epoxoline		
Insulating Coating Tie-Coat	---	6.0
Tnemec Series 971 Aerolon		
Insulating Coating	---	50.0
Tnemec Series 1028 Enduratone		
Insulating Coating Topcoat	---	3.0
Sherwin Williams Heat-Flex® Hi-Temp 3500		
Insulating Coating	---	20.0
Sherwin Williams Shercryl HPA		
Insulating Coating Topcoat	---	3.0
Sherwin-Williams Products		
ProMar 200 Primer (sprayed)	200	
ProMar200 Primer (rolled/brushed)	260	
ProMar 200 Enamel (sprayed)	280	
ProMar 200 Enamel (rolled/brushed)	360	

** Roller or brush application requires two or more coats to obtain recommended film thickness. No allowance is made here for overspray, waste in handling, mixing, or application. Final, minimum total DFT shall be equal to that specified. Paint submittals shall note where roller or brush application is proposed and the paint manufacturer's recommendations of number of coats to achieve the required thickness shall be noted.

Primer, intermediate and/or final surface colors shall be of contrasting colors to promote coverage.

- D. Pipe Colors: Colors are to be selected by OWNER, with the following piping colors used where applicable. Pipe color shall be in accordance with the requirements of the Illinois Administrative Code.

Pipe Type	WATER PIPING COLORS
	10 States Standards (2012 Water)
Chlorine (solution)	Yellow

Section 653.120 Piping Identification:

- 1) Piping in a water treatment facility shall be identified clearly by legends and color coding as described in the Standards or American National Standards Institute (ANSI) Standard A-13.1. A consistent standard shall be used throughout the system.
- 2) Potable water lines shall be clearly and permanently identified where dual water lines or pressure sewer systems exist.

- E. Shop Finish Painting: The following items shall have factory-applied finishes and will not require field painting. CONTRACTOR shall field touch-up any damaged areas with factory-provided touch-up coating.
1. Overhead coiling doors.
 2. Aluminum windows, doors and entrances.
 3. Fiberglass doors, equipment, structures, stairs, and railing.
 4. Hoists, trolleys, and cranes.
 5. Factory-finished HVAC equipment.
 6. Chemical feed system pumps and accessories.
 7. Laboratory furniture and equipment.
 8. Samplers.
 9. Furniture.
 10. Parshall flume liners.
 11. VFD enclosures.
 12. Supervisory control centers.

END OF SECTION

SECTION 10 28 00
TOILET AND BATH ACCESSORIES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Toilet, Bath, Shower, and Washroom Accessories.
 - 2. Grab Bars.
 - 3. Attachment Hardware.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI A117.1–Safety Standards for the Handicapped.
- B. ASTM A123–Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A269–Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- D. ASTM A1008–Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- E. ASTM B456–Electro-deposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.03 REGULATORY REQUIREMENTS

- A. Conform to ANSI A117.1 and Federal ADA-AG code and the 2021 International Building Code for access for the handicapped.

PART 2–PRODUCTS

2.01 TOILET TISSUE DISPENSERS

- A. Multiroll dispensers shall be surface-mounted. Bobrick B-288, Bradley 5402, or equal. Provide total of one.
- B. Unit shall be Type 304 stainless steel with satin finish.

2.02 HOOKS

- A. Heavy-duty hooks shall be Bobrick B-2116, Bradley Model 911, or equal. Provide total of 2.

- B. Hook and flange shall be brass castings with satin nickel-plated finish.

2.03 SOAP DISPENSER

- A. Surface-mounted liquid soap dispensers shall be Bobrick B-86, Bradley 657, or equal. Provide total of two.
- B. Unit shall be chrome-plated brass with plastic container.
- C. Install one above each toilet room sink and one at laboratory bench sink.

2.04 TOWEL DISPENSERS

- A. Surface-mounted, 400 single-fold towel dispensers shall be Bobrick B-263, Bradley 251-15, or equal. Provide total of two.
- B. Unit shall be Type 304 stainless steel with satin finish.
- C. Locate one near toilet room sink and one at laboratory bench sink.

2.05 WASTE RECEPTACLE

- A. Waste receptacles shall be swing-type, free-standing Bobrick B-2250, Bradley 377, or equal.
- B. Units shall be stainless steel with satin finish.
- C. Provide one unit for toilet room.

2.06 MIRRORS

- A. Mirrors shall be shelfless mirrors without frames, 24 inches by 36 inches high, Bradley 747 with clip fasteners, or equal. Provide a total of one.
- B. Mirrors shall have heavy gauge 304 stainless steel frame with satin finish and No. 1 quality, 1/4-inch float plate-glass mirror.

2.07 GRAB BARS

- A. Provide stainless steel, peen grip with satin finish, 1 1/4-inch-diameter grab bars. Bars shall be concealed mounted-type, Bobrick B-550.99X18, B-550.99X36 and B-550.99X42; Bradley 832-00118, 832-00136 and 832-00142, or equal.
- B. See Drawings for configuration of grab bars.

2.08 UNDERSINK PROTECTIVE PIPE COVERS

- A. ADA-conforming, wheelchair-accessible lavatory P-trap and angle valve assemblies shall be covered with molded, antimicrobial undersink protective pipe covers, TRUE BRO, INC. LAV GUARD 2 No. 103 E-Z and No. 402 with 105 E-Z accessory, 1-800-340-5969, or equal.
- B. Cover shall be secured with reusable fasteners and access covers.

- C. Coordinate protective pipe covers for tailpiece and extensions to fit lavatories.
- D. Standard color to be selected by OWNER.

2.09 KEYING

- A. Supply two keys for each accessory to OWNER.
- B. Key all accessories alike.

PART 3-EXECUTION

3.01 INSTALLATIONS

- A. Install accessories in accordance with manufacturers' instructions, ANSI A117.1, Federal ADA-AG, and the 2021 International Building Code.
- B. Install plumb and level securely and rigidly anchored to substrate.

END OF SECTION

SECTION 10 44 43

FIRE EXTINGUISHERS AND ACCESSORIES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Fire extinguishers.
 - 2. Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/NFPA 10–Portable Fire Extinguishers.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00–Submittals.
- B. Product Data: Provide extinguisher operational features, color and finish, anchorage details, and cabinet dimensions.

1.04 QUALITY ASSURANCE

- A. Provide units conforming to NFPA 10 requirements for portable fire extinguishers.
- B. Provide fire extinguisher, cabinets, and accessories by single manufacturer.

PART 2–PRODUCTS

2.01 MANUFACTURERS

- A. Larsen's Manufacturing Company, Product MP Series.
- B. Substitutions: Under provisions of Section 01 60 00–Materials and Equipment.

2.02 EXTINGUISHERS

- A. Provide five dry-chemical-type, Larsen's MP Series, 10-pound-capacity fire extinguishers. Fire extinguishers shall be UL-approved for Class A, Class B, and Class C fires.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Place extinguishers in brackets where shown on the Drawings.
- C. Mount fire extinguisher so the handle is at 48 inches above the finished floor.
- D. The fire extinguishers will be located in the following buildings:
 - 1. Eastern Receiving and Pumping Station: Three.
 - 2. Western Receiving and Pumping Station: Two.

END OF SECTION

SECTION 11 53 00

LABORATORY FURNITURE AND EQUIPMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Steel Casework.
 - 2. Work Surfaces.
 - 3. Sinks and Outlets.
 - 4. Service Fittings.
 - 5. Accessory Equipment.
 - 6. Laboratory Equipment.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. SEFA 8: Laboratory Furniture, Casework, Shelving, and Tables Guidelines Science Equipment and Furniture Association (SEFA).

1.03 CASEWORK DESIGN REQUIREMENTS

- A. Flush Construction: Surfaces of doors, drawers, and panel faces shall align with cabinet fronts without overlap of case ends and top or bottom rails. Horizontal- and vertical-case shell members (panels, top rails, and bottoms) shall meet in the same plane without overlap, cracks, or crevices.
- B. Self-Supporting Units: Completely welded shell assembly without applied panels at ends, backs, or bottoms so that cases can be used interchangeably or as a single, stand-alone unit.
- C. Interior of Case Units: Easily cleanable, flush interior. Cupboard bottom shall be full depth and width of unit on all cases to prevent dust from entering cabinet.
- D. Drawers: Sized on a modular basis for interchange to meet varying storage needs, and designed to be easily removable in field without the use of special tools.
- E. Case Openings: Rabbeted-like joints all four sides of case opening for hinged doors and two sides for sliding doors to provide dust-resistant case.
- F. Framed Glazed Doors: Identical in construction, hardware, and installation to solid panel doors. Design frame-glazed doors to be removable for glass replacement.

1.04 CASEWORK PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements: Casework components shall withstand the following minimum loads without damage to the component or to the casework operation:
 - 1. Steel base unit load capacity: 500 pounds per linear foot.
 - 2. Suspended units: 300 pounds.
 - 3. Drawers in a cabinet: 150 pounds.
 - 4. Utility tables (four-legged): 300 pounds.
 - 5. Hanging wall cases: 300 pounds.
 - 6. Load capacity for shelves of base units, wall cases, and tall cases: 100 pounds.
- B. Metal Finish Performance Requirements:
 - 1. Hardness: Surface hardness equivalent to 4H pencil, minimum.
 - 2. Humidity resistance: Withstand 1,000-hour exposure in saturated humidity at 100°F, per ASTM D2247-85.
 - 3. Moisture resistance:
 - a. No visible effect to surface finish after boiling water trickled over test panel inclined at 45 degrees for 5 minutes.
 - b. No visible effect to surface finish following 100-hour continuous application of a water-soaked cellulose sponge, maintained in a wet condition throughout the test period.
 - 4. Adhesion: Score finish surface of test panel with razor blade into 100 squares, 1/16 inch by 1/16 inch, cutting completely through the finish but with minimum penetration of the substrate, and brush away particles with soft brush. Minimum 90 squares shall maintain their finish.
 - 5. Salt spray: Withstand minimum 250-hour salt spray test, per ASTM B117-85.
- C. Chemical Resistance Finish Performance Requirements:
 - 1. Test procedure: Apply 10 drops (approximately 0.5 cubic centimeters) of each reagent identified in the SEFA 8 requirements to the surface of the finished test panes laid flat and level on a horizontal surface. Ambient temperature: 68° to 72°F (20° to 22°C). After 1 hour, flush away chemicals with cold water and wash surface with detergent and warm water at 150°F (65.5°C) and with alcohol to remove surface stains. Examine surface under 100 foot-candles of illumination.
 - 2. Evaluation ratings: Change in surface finish and function shall be described by the following ratings:
 - a. Level 0—No detectable change.
 - b. Level 1—Slight change in color or gloss.
 - c. Level 2—Slight surface etching or severe staining.
 - d. Level 3—Pitting, cratering, swelling, erosion of coating, obvious and significant deterioration.
 - 3. Test results to match SEFA 8 requirements for color selected by OWNER.

1.05 WORK SURFACE PERFORMANCE REQUIREMENTS

- A. Test Procedure: Apply five drops of each reagent to surface and cover with 25 mm watch glass, convex side down; test volatiles using 1-ounce bottle stuffed with saturated cotton. After 24-hour exposure, flush surface clean, rinse, and wipe dry.
- B. Evaluation Ratings: Change in surface finish and function shall be described by the following ratings:

1. No effect: No detectable change in surface material.
 2. Excellent: Slight detectable change in color or gloss, but no change to the function or life of the work surface material.
 3. Good: Clearly discernible change in color or gloss, but no significant impairment of work surface function or life.
 4. Fair: Objectionable change in appearance because of surface discoloration or etch, possibly resulting in deterioration of function over an extended period.
 5. Failure: Pitting, cratering, or erosion of work surface material; obvious and significant deterioration.
- C. Test Results—Epoxy Resin Work Surface: Test results to comply with Thermo Hamilton Epoxy Resin Work Surface Test.

1.06 SUBMITTALS

- A. Submittals shall comply with the requirements of Section 01 33 00—Submittals.
- B. Shop Drawings: Provide 1/2 inch = 1 foot 0 inch scale elevations of individual and battery of casework units, cross sections, rough-in and anchor placements, tolerances and clearances. Indicate relation of units to surrounding walls, windows, doors, and other building components. Provide 1/4 inch = 1 foot 0 inch rough-in plan drawings for coordination with trades. Rough-in shall show free area.
- C. Test Reports: Submit test reports verifying conformance to test performance specified.

1.07 QUALITY ASSURANCE

- A. Single Source Responsibility: Casework, work surfaces, and accessories shall be manufactured or furnished by a single laboratory furniture company.
- B. Manufacturer's Qualifications:
1. Five years or more experience in manufacture of laboratory casework and equipment of type specified.
 2. Ten installations of equal or larger size and requirements.
- C. Installer shall be factory-certified by the manufacturer.
- D. Cabinet Identification: New cabinets to be installed are identified on Drawings by letter. New equipment to be installed is identified by number. Unless otherwise modified on Drawings or in Specifications, catalog description constitutes specific requirements for each type of cabinet.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Schedule delivery of casework and equipment so that spaces are sufficiently complete that material can be installed immediately following delivery.
- B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

- C. Protect all work surfaces throughout construction period with 1/4-inch corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing."

1.09 PROJECT CONDITIONS

- A. Do not deliver or install equipment until the following conditions have been met:
1. Windows and doors are installed and the building is secure and weathertight.
 2. Ceiling, overhead ductwork, and lighting are installed.
 3. All painting is completed and flooring is installed.

PART 2-PRODUCTS

2.01 LABORATORY FURNITURE

- A. Acceptable manufacturer includes the following, or equal: Mott Manufacturing, Ltd. (Brantford, Ontario, Canada).
- B. Schedule of items to be provided is as follows: Model Nos. refer to Mott, unless otherwise noted.

Designation	Description	Model No.
A	58-inch end sink unit with sink supports, sink, and five faucets	9900018, SSK1058 (2 required), #U71C22, LWM1-A11-E11 (one required), LWS2-A11-E11 (four required)
B	28-inch deep apron unit with drawer with gable legs	AUA0436, GLS1023
C	36-inch hinged framed glass door wall case	5470030 (2 required)

- C. Provide scribing strips, filler panels, and enclosures as required.

2.02 CASEWORK MATERIALS

- A. Sheet Steel: Mild, cold-rolled, and leveled unfinished steel.
- B. Minimum Gauges:
1. 20 Gauge: Solid door interior panels, drawer fronts, scribing strips, filler panels, enclosures, drawer bodies, shelves, and security panels.
 2. 18 Gauge: Case tops, ends, bottoms, bases, backs, vertical posts, uprights, glazed door members, door exterior panels, and access panels.
 3. 16 Gauge: Top front rails, top rear gussets, intermediate horizontal rails, table legs and frames, and leg rails and stretchers.
 4. 14 Gauge: Drawer suspensions, door and case hinge reinforcements, and front corner reinforcements.
 5. 11 Gauge: Table leg corner brackets and gussets for leveling screws.
- C. Glass for Glazed Swinging and Sliding Doors: 7/32-inch (6 mm)-thick, clear laminated safety glass.

2.03 CASEWORK FABRICATION

A. Base Units and Cases:

1. Base units and 25-inch-, 31-inch-, and 37-inch-high wall cases: End panels and back reinforced with internal reinforcing front and rear posts.
2. 49-inch- and 84-inch-high cases: Formed end panels with front and rear reinforcing post channels; back shall be formed steel panel, recessed 3/4 inch for mounting purposes.
3. Posts: Front post fully closed with full height reinforcing upright. Shelf adjustment holes in front and rear posts shall be perfectly aligned for level setting, adjustable to 1/2 inch on center.
4. Secure intersection of case members with spot and arc welds. Provide gusset reinforcement at front corners.

B. Drawers:

1. Drawer fronts: 3/4-inch-thick, double-wall construction, prepainted prior to assembly, and sound-deadened; top front corners welded and ground smooth.
2. Drawer bodies: Bottom and sides formed into one-piece center section with bottom and sides coves and formed top edges. Front and back panels spot-welded to center section.
3. Drawer suspension: Heavy-duty coved raceways for both case and drawer with nylon-tired, ball-bearing rollers; self-centering and self-closing when open to within 5 inches of the closed position.
4. Provide drawer with rubber bumpers. Friction centering devices are not acceptable.
5. Provide security panels for drawers with keyed different locks.
6. File drawers: Provide with full extension slides for full access and operation.

C. Doors:

1. Solid panel doors: 3/4 inch thick, double wall, telescoping box steel construction with interior prepainted and sound-deadened; all outer corners welded and ground smooth. Reinforce interior of front panel with welded steel hat channels. Hinges with screws to internal 14 gauge reinforcing in case and door. Hinges shall be removable; welding of hinges is not acceptable. Doors shall close against rubber bumpers.
2. Frame-glazed doors: Outer head to be one-piece construction. Inner head to consist of top, bottom, and side framing members that are removable for installation or replacement of glass. Provide continuous vinyl glazing retainer to receive glass. In all other respects, framed glazed door construction and quality shall match solid panel doors.
3. Sliding doors, solid- or framed-glazed: Design for tilt-out removal after removal of bottom guide. Doors shall be hung with nylon-tired sleeve-bearing rollers in formed steel, top-hung track and shall close against rubber bumpers.
4. Unframed sliding glass doors: Glass with edges ground set in extruded aluminum shoe with integral pulls, wheel assemblies, and top and bottom extruded aluminum track. Provide rubber bumpers at fully opened and closed door position.

D. Shelves:

1. Form front and back edges down and back 3/4 inch. Form ends down 3/4 inch.
2. Reinforce shelves over 36 inches long with welded hat channel reinforcement the full width of shelf.
3. Pull out shelves: Same suspension as specified for drawers.

- E. Base Molding: 4 inches high, black rubber or vinyl; inside corners mitered and outside corners wrapped. Base molding around lab casework is by flooring contractor.
- F. Hardware:
 - 1. Drawer and hinged door pulls: Clear anodized extruded aluminum, screw attached on minimum 4 1/4-inch centers.
 - 2. Sliding door pulls: Recessed stainless steel, styled and sized to harmonize with drawer pulls.
 - 3. Hinges: Institutional-type, five knuckle-projecting barrel hinges, minimum 2 1/2 inches long, Type 302 or 304 stainless steel. Provide two hinges for doors up to 36 inches high; three hinges for doors over 36 inches high. Drill each leaf for three-screw attachment to door and frame.
 - 4. Door catches: Adjustable-type, spring-actuated nylon roller catches.
 - 5. Elbow catches: Spring-type of cadmium-plated steel, with strike of suitable design.
 - 6. Locks: National Lock Remove-A-Core 5-disk tumbler, heavy-duty cylinder type. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers.
 - 7. Label holders: Formed steel with satin chrome finish, 1 inch by 1 1/2 inches, screw installed. Label holders will be provided where shown on elevation drawings.
 - 8. Shelf clips: Die-formed steel, zinc-plated, designed to engage in shelf adjustment holes.
 - 9. File followers: Metal backs engaging in steel bottom channel with spring positioning lock.

2.04 METAL FINISH

- A. Prepare all surfaces, make free of defects with welds ground smooth and indistinguishable from surrounding metal.
- B. Components shall be cleaned in a four-stage chemical spray process that produces an iron phosphate coating bonded to the steel surfaces. Components shall be thoroughly oven-dried before painting.
- C. Components shall be electrostatically coated with an epoxy/urethane powder applied in a controlled environment then baked/cured in a temperature controlled oven to provide a smooth hard finish. Surface shall be a chemical resistant, high quality laboratory grade finish. The resulting paint coating shall provide a minimum film thickness of 1.2 mils on all exposed parts and an average film thickness of 1.0 mils on all other surfaces.

2.05 EPOXY RESIN WORK SURFACE

- A. Material: Chemical- and abrasion-resistant, durable countertop of 1-inch-thick cast material of epoxy resins and inert products, cast flat, with a uniform low-sheen black surface. Provide new countertop, curbs, ledges, and reagent rack tops throughout new laboratory.
- B. Backsplash Curb: Same material as countertop, 6 inches high, butt-jointed, and cemented to top. Provide where indicated on Drawings and at reagent ledges. Include end curb where top abuts end wall.
- C. Ledges: Same material as countertop. Provide 6-inch-high by 7 1/2-inch-wide single-faced units and 6-inch-high by 9-inch-wide double-faced units as shown on Drawings. Ledge face

shall permit installation of service fixtures and top shall be removable for access to service utilities. Ledges are required only if shown on Drawings.

- D. Reagent Rack Top: Same material as countertop.

2.06 SINKS, DRAINS AND TRAPS

- A. Epoxy Resin Sinks: Integrally molded from modified thermosetting black epoxy resin, specially compounded and oven cured. Cove inside corners and pitch bottom to threaded drain outlet.
- B. Sink Supports:
1. Cabinet sinks: Support sinks on 11 gauge adjustable 1-inch by 2-inch by 1-inch channel with reagent-resistant finish. Provide two channels across width of cabinet attached to 3/8-inch-diameter threaded hanger rods.
 2. Table sinks: Support sinks on 2-inch-wide U-shaped steel straps screwed to cross rails. Straps shall be 1/4-inch thick; 1/2-inch thick for sinks over 250 square inches in area. Straps shall have baked-enamel finish.
 3. Caulk joint between top and sink with nonhardening mastic.
- C. Troughs: Cast epoxy resin troughs without longitudinal joints, with bottom edges, coves, and with bottom sloped minimum 1/8 inch per foot to drain. Provide cemented epoxy end caps at trough terminations. Seal joint between trough and tabletop watertight with acid- and alkali-resistant compound.

2.07 LABORATORY FITTINGS

- A. Water Service Fittings:
1. Water service faucets and valves shall have renewable unit containing all working parts subject to wear, including replaceable stainless steel seat. Unit shall have serrations for position-locking into valve body.
 2. Gooseneck vacuum breakers: Brass forgings integral with gooseneck with renewable seat and special design valve member for fine flow control.
 3. Goosenecks shall have separate 3/8-inch IPS coupling securely brazed to gooseneck to provide full thread for attachment of antislash outlet fittings, serrated tips, and filter pumps.
- B. Handles for Service Cocks, Faucets, and Remote Controls: One-arm-type except ground key cocks. Provide removable screw-on-type colored plastic disks with letter stamped on disk in contrasting color as scheduled below:

Service	Disk/Letter Colors	Letters
Cold Water	Green/White	C.W.
Hot Water	Red/White	H.W.

- C. Fixture Finish: Chrome finish developed by the following sequence of platings over properly prepared brass castings or forgings:

Plating	Minimum Plating Thickness
Copper (Initial)	0.000050 inch
Nickel	0.000350 inch
Chromium (Final)	0.000015 inch

2.08 ACCESSORY EQUIPMENT

- A. Service Support Struts: Heavy 1/4-inch by 1 1/2-inch steel channel uprights:
 1. Fasten at top and bottom with U-shaped spreader and bolts designed to support tops, box curbs, troughs, hoods, or other heavy loads.
 2. Service piping and drain line hanger supports are to be provided by contractor providing these services.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Casework Installation:
 1. Set casework components plumb, square, and straight with no distortion and securely anchored to building structure. Shim as required using concealed shims.
 2. Bolt continuous cabinets together with joints flush, tight, and uniform and with alignment of adjacent units within 1/16 inch tolerance.
 3. Secure wall cabinets to solid supporting material, not to plaster, lath, or gypsum board.
 4. Abut top edge surfaces in one true plane. Provide flush joints not to exceed 1/8 inch between top units.
- B. Work Surface Installation:
 1. Where required because of field conditions, scribe to abutting surfaces.
 2. Only factory-prepared field joints located in accordance with approved shop drawings shall be permitted. Secure joints in field where practicable in the same manner as in factory with dowels, splines, adhesive, or fasteners recommended by manufacturer.
 3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.
- C. Sink Installation: Sinks that were not factory-installed shall be set in chemical-resistant sealing compound and secured and supported in accordance with manufacturer's recommendations.
- D. Accessory Installation: Install accessories and fittings in accordance with manufacturer's recommendations. Turn screws to seat flat; do not drive.

3.02 ADJUSTING

- A. Repair or remove and replace defective work as requested by ENGINEER upon completion of installation.
- B. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.03 CLEANING

- A. Clean shop-finished casework, touchup as required.
- B. Clean counter tops with diluted dishwashing liquid and water, leaving tops free of all grease and streaks. Do not use wax or oils.

3.04 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent exposure of casework and equipment to other construction activity.
- B. Advise CONTRACTOR of procedures and precautions for protection of material and installed laboratory casework and fixtures from damage by work of other trades.

END OF SECTION

SECTION 12 48 43

FLOOR MATS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Switchboard Mats.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 2—PRODUCTS

2.01 DIAMOND-PLATE SWITCHBOARD MATS

- A. Switchboard mats shall be diamond-plate, high-performance, nonconductive, switchboard matting. Matting shall conform to ANSI/ASTM D-178-01, Type II, Class 2.
- B. Acceptable manufacturers shall include the following, or equal: Wearwell Carpet, No. 701. Mats shall be 3 feet wide and extend the full length of the equipment.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Install mats after cleaning of finish flooring.
- B. Provide mats for all freestanding or pad-mounted electrical equipment, where show on the Drawings.

END OF SECTION

SECTION 12 51 00

OFFICE FURNITURE

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Office, Conference Room, Lunch Room, and Training Room Furniture.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 OFFICE FURNITURE ALLOWANCE

- A. CONTRACTOR shall include in the Bid, an allowance of \$15,000 for office furniture to be provided in the office of the East Station. OWNER shall make a selection of the needed office furniture and provide the list to CONTRACTOR. CONTRACTOR shall then purchase, provide, and install furniture as listed by OWNER. Contract amount will be adjusted (add or deduct by change order based on the actual cost of office furniture selected by OWNER.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 20 05 53

IDENTIFICATION FOR FIRE SUPPRESSION, PLUMBING, AND HVAC PIPING AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Perform all work required to furnish and install equipment, valve, pipe, and wire identification with supplementary items necessary for proper installation as specified herein, or shown on the Drawings. CONTRACTOR shall identify all equipment, valves, piping, ductwork, dampers, pumps, and wires.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.03 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASME A13.1–Scheme for the Identification of Piping Systems.
 - 2. NFPA 13–Installation of Sprinkler Systems.
 - 3. NFPA 14–Installation of Standpipe and Hose Systems.
 - 4. NEPA 45–Fire Protection for Laboratories Using Chemicals.
 - 5. Illinois Plumbing Code.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging with labels clearly identifying product name and manufacturer until ready for installation.
- B. Storage: Store materials in clean, dry area indoors until ready for installation.
- C. Handling: Protect materials and finish from damage during handling and installation.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA.
- C. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 MANUFACTURERS

- A. Equipment tags, valve tags, and pipe markers shall be manufactured by Marking Services, Incorporated, Seton Name Plate Company, WH Brady Company, or Graphic Products, Inc.

2.02 EQUIPMENT TAGS

- A. Plastic Labels For Equipment (Indoor Application):
 - 1. Use: All equipment purchased by CONTRACTOR or OWNER and CONTRACTOR installed included in Divisions 21, 22, or 23.
 - 2. Materials and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch thick.
 - 3. Character Color: Black.
 - 4. Background Color: White.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 1-inch by 3-inch.
 - 6. Minimum Letter Size: 1/4 inch.
 - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment (Outdoor Application):
 - 1. Use: All equipment purchased by CONTRACTOR or OWNER and CONTRACTOR installed included in Divisions 21, 22, or 23.
 - 2. Material: MS-215 Max-Tek with printed graphics protected by a chemical and UV resistant MS-3000 top laminate.
 - 3. Letter Color: Black.
 - 4. Background Color: White.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 1-inch by 3-inch.
 - 6. Minimum Letter Size: 1/4 inch.
 - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2.03 LABELING TAGS

- A. Labeling Tags:

Use: Field-mounted devices (Limit switches, Natural gas pressure regulators, etc.).
Size: 1-inch by 3-inch.
Material: 1/32-inch-thick stainless steel.
Character Size: 1/4 inch.
Engraving: As requested by ENGINEER.

2.04 WIRE MARKERS

- A. Wire markers shall be permanently attached wraparound adhesive, sleeve- or heat-shrink-type labels. Wire numbering preprinted on the conductor, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable.
- B. Wire markers shall be specifically printed for this project using a wire marker printer. Handwritten markers are not acceptable.

2.05 PIPE MARKERS

- A. Manufacturers: Marking Systems, Inc., Seton Name Plate Company, W.H. Brady Company, or equal.
- B. Pipe markers shall conform to ANSI A13.1. Arrow markers must have same ANSI background colors as their companion pipe markers or be incorporated into the pipe identification marker.
- C. Plastic Pipe Markers: Factory-fabricated, flexible, semirigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Pipe markers and arrow markers also shall be provided for all piping systems.
- E. Use Seton Setmark type SNA or Brady Snap-on type identification for all piping systems, up through 6 inches. For piping systems larger than 6 inches, use Seton or Brady strap-on markers, or similar, by Marking Services, Inc. Self-adhesive labels that stick directly to the pipe or insulation jacketing are not acceptable. Provide lettering in accordance with the following table.

PIPE MARK SIZE CHART

Outside Pipe Diameter (Including Covering), Inch	Minimum Length of Label Field Color, Inch	Minimum Height of Letters, Inch
3/4 to 1 1/4	8	1/2
1 1/2 to 2	8	3/4
2 1/2 to 6	12	1 1/4
8 to 10	24	2 1/2
Over 10	32	3 1/2

PART 3-EXECUTION

3.01 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state, and local requirements and referenced standards and conform to code and ordinances of authorities having jurisdiction.
- B. Degrease and clean surfaces to receive nameplates.
- C. Install nameplates parallel to equipment lines.
- D. Affix nameplates with stainless steel screws or sticky-back adhesive.

- E. Affix labeling tags with permanent bonding cement or locking wire ties. Provide 3/8 inch hole to accommodate wire tie.
- F. Prepare and install neatly typed directions in all panels, including existing panels, where work is done under this Contract.
- G. Four-inch-round, 4-inch-square, and 4 11/16-inch junction boxes concealed above ceilings may be identified with neat lettering on the cover with a permanent-type black marking pen.

3.02 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, control panels, thermostats, junction boxes, and at load connection. Identify with branch circuit or feeder number for power circuits and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Wire markers shall be permanently attached wraparound adhesive or heat-shrink-type markers. Wire numbering preprinted on the conductor, individual wraparound numbers, and flag-type labels are not acceptable.
- B. Conductors in pull boxes, VFD enclosures, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system.

3.03 PIPE MARKERS

- A. Install pipe markers in accordance with manufacturer's instructions.
- B. Install in clear view and align with axis of piping.
- C. All pipes shall be labeled with a minimum of two labels in each room, crawl space, or compartment. Locate identification at maximum 20-foot centers on straight runs, including risers and drops adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction. Labels shall be abbreviated as noted under fluid abbreviations on drawings.
- D. All piping containing or transporting hazardous or corrosive chemicals shall be identified with labels every 10 feet and with at least two labels in each room, closet, or pipe chase.
- E. Labels shall identify fluid being conveyed and include flow direction arrow. Provide a double-ended arrow marker when flow can be in either or both directions.
- F. Indicate delivered water temperature on domestic hot water supply and return lines.
- G. CONTRACTOR shall include a schedule in its submittal identifying the various pipe designations, abbreviations, and labeling scheme. Colors, text, and piping abbreviations are to be selected by OWNER, with the following piping marker scheme used where applicable.

Pipe Contents	Label Colors (Background/Text)
Water Lines	
Non-potable water	Green/White
Potable water	Green/White

Pipe Contents	Label Colors (Background/Text)
Other Lines	
Condensate	Blue/White
Fire protection	Red/White
Natural gas	Brown/White
Plumbing drains and vents	Green/White
Stormwater	Green/White

END OF SECTION

SECTION 21 10 00

WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: There is one automatic fire sprinkler zone scheduled and outlined on the Drawings. The zone connects to a sprinkler riser and bulk distribution main. The zone is a wet sprinkler system, and it begins with a zone control valve with tamper switch, flow switch, 1-inch inspector's test valve, and auxiliary drain valve.
- B. Provide complete fire protection systems that are compatible with the fire alarm system in accordance with the Factory Mutual Research Approval Guide. The fire protection system shall include all necessary piping, valves, controls, fittings, and hardware for each of the following buildings and the corresponding system types:
- C. Work under this section shall commence with a connection to the potable water service and all interior fire protection systems.
- D. CONTRACTOR may install additional piping and fittings and valves not shown on the Drawings for testing purposes or for the convenience of the installation. Where such materials are installed, they shall comply with the specifications and shall be sized to be compatible with the system design. Remove such installed materials when they interfere with the design conditions.
- E. Information given herein and on Drawings is as exact as could be secured but is not guaranteed. Do not scale Drawings for exact dimensions. Where architectural features govern location of work, refer to architectural drawings. Check, verify, and coordinate work with drawings and specifications prepared for other trades. Include all modifications, relocations, or adjustments necessary to complete work or to avoid interference with other trades.
- F. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 CODES AND STANDARDS

- A. Comply with requirements of 2021 International Building Code, local fire chief or fire marshal, insurance underwriter, and applicable National Fire Protection Association (NFPA) Standards (latest editions).
- B. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- C. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASSE 1015—Double Check Backflow Prevention Devices and Double Check Fire Prevention Backflow Prevention Assemblies.
 - 2. NFPA 13—Installation of Sprinkler Systems.

3. NFPA 14–Installation of Standpipe and Hose Systems.
4. NFPA 20–Installation of Stationary Pumps for Fire Protection.
5. NFPA 22–Water Tanks for Private Fire Protection.
6. NFPA 24–Installation of Private Fire Service Mains and Their Appurtenances.
7. NFPA 25–Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
8. NFPA 45–Fire Protection for Laboratories Using Chemicals.
9. NFPA 72–National Fire Alarm and Signaling Code.
10. NFPA 231–General Storage.
11. NFPA 329–Handling Releases of Flammable and Combustible Liquids and Gases.
12. Underwriters Laboratories Fire Protection Equipment Directory.
13. Current Factory Mutual Approval Guide.
14. Local and State Building, Mechanical and Fire Codes.

1.03 QUALITY ASSURANCE

- A. All Drawings and hydraulic calculations shall be signed and sealed by a registered architect, Professional Engineer, or fire protection systems designer or signed and dated by the contractor responsible for the design and installation of the system, in accordance with the Illinois Administrative Code.
- B. CONTRACTOR shall be licensed by the State of Illinois for installation of sprinkler fire protection systems.
- C. CONTRACTOR(s) shall submit prequalification evidence of at least five projects of comparable size and scope successfully completed with their Bid, if requested. Distortion or misrepresentation of qualification evidence may result in Contract cessation.
- D. UL and FM Compliance: Unless otherwise indicated, all products shall be listed in the latest publication of Approval Guides for Underwriters Laboratory and Factory Mutual for the service intended. All system components shall be in conformance with applicable NFPA Standards.
- E. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to OWNER.
- F. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

1.04 DESIGN CRITERIA

- A. Available water supply data (preliminary) is as follows:

Hydrant ID	Location	Date	Time	Flow (gpm)	Static Pressure (psi)	Residual Pressure (psi)
Existing Fire Hydrant No. 1	Caton Farm Road	---	---	2,000	68	57

- B. Water test data is preliminary for Bidding purposes. CONTRACTOR shall perform flow tests prior to preparation of design calculations. Test shall be representative of high water-use periods.
- C. Design fire protection systems in accordance with codes, standards, and regulations noted above. Design sprinkler systems for the most hydraulically remote area based on the following:

Zone Description	Area (sf)	Sprinkler System Type	Area of Sprinkler Operation (sf)	Sprinkler Density (gpm/sf)	Occupancy Classification	Total Combined Inside/Outside Hose (gpm)
1	240	Wet	240	0.2	Ord. Haz., Group 2	250

- D. Maximum head spacing according to NFPA 13 for each occupancy hazard indicated.
- E. Hydraulic Calculations: Sprinkler systems which shall be hydraulically designed must be designed a minimum of 10% or 10 psi, whichever is greater, below the available water curve.
- F. Hose Streams: Add indicated hose streams to all sprinkler zone hydraulic calculations at the base of the riser.
- G. Water velocity throughout the entire system shall not exceed 20 feet per second.
- H. Where weld fittings or mechanical grooved fittings are used, use only long radius elbows.
- I. Fire protection system components shall be rated for minimum operating pressure of 175 psig.
- J. Hangers and Supports for Fire Suppression Piping and Equipment:
1. Materials and application of pipe hangers and supports shall be in accordance with MSS SP-58 Pipe Hangers and Supports—Materials, Design, Manufacture, Selection, Application and Installation unless noted otherwise.
 2. Materials and application of pipe hangers and supports shall be in accordance with NFPA rulings and be UL/FM listed and approved.
 3. Piping connected to pumps, compressors, or other rotating or reciprocating equipment is to have vibration isolation supports for a distance of 100 pipe diameters or three supports away from the equipment, whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the 100-pipe diameter/3 support distance.
- K. Hazardous Locations: All fire protection devices in these spaces shall be rated for the respective classification. Hazardous locations include the following:

Room No.	Room Name	Classification
1501	Chemical Room	H-Occupancy

1.05 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals. The provisions outlined in this section shall expand and supplement the requirements specified in Division 01. Where additional or differing requirements are indicated, the more stringent provision applies.
- B. Submittals shall be sent to and approved by the Authority Having Jurisdiction prior to submitting to ENGINEER. Include copy of approval letters in submittal to ENGINEER. Submittals shall be sent to OWNER's property insurer for approval and a copy of the approval letter shall be provided to ENGINEER.
- C. Submit fire protection system drawings at minimum scale of 1/8 inch equals 1 foot 0 inches for floor plans and 1/2 inch equals 1 foot 0 inches for details. Drawings shall include water supply locations and size, piping layout and size, sprinkler locations and type, piping and fire protection specialty locations and type, valve stem movement, hanger locations and type, lighting, ductwork, equipment locations and type, valve locations and type, occupancy classes, hydraulic reference points, design areas, hose locations, and discharge densities. Include incidental details not usually shown or specified but necessary for proper installation and operation. Submittal drawings shall be stamped by the designer.
- D. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all fire protection installations. Indicate locations where space is limited and where sequencing and coordination of installations are of importance to other trades.
- E. Submit hydraulic calculations for water supply and sprinkler systems. Include summary sheet and detailed work sheets. Describe characteristics of water supply and location of effective point used in calculations. Include graph illustration of water supply, hose demand, and sprinkler demand.
- F. Furnish product submittals for all equipment and systems. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number as indicated in the Contract Documents. Where more than one item appears on a manufacturer's catalog sheet, the item(s) to be used shall be indicated by a red marking or an arrow. Include project specific wiring diagrams of electrically powered equipment.
- G. Material submittals shall include all items listed in the product section and all additional items necessary to provide a complete installation.

1.06 OPERATION AND MAINTENANCE MANUALS

- A. Assemble materials as noted in Section 01 33 00–Submittals for each system or type of equipment. In addition to the Division 01 requirements, include the following information:
 - 1. Copies of all approved submittals along with approval letters.
 - 2. Manufacturer's wiring diagrams for electrically powered equipment.
 - 3. Records of tests performed to certify compliance with system requirements.
 - 4. Certificates of inspection by regulatory agencies.
 - 5. Parts lists for equipment and specialties.
 - 6. Manufacturer's installation, operation, and maintenance recommendations for equipment and specialties.

7. Valve types and locations.
8. Warranties.
9. Additional information as required for records and maintenance of system.
10. Lubrication instructions including list/frequency of lubrication.
11. Two copies of NFPA 25 current for the year the system is installed.

1.07 RECORD DRAWINGS

- A. Maintain at the site an up-to-date marked set of “record” drawings that shall be corrected and delivered to ENGINEER upon completion.
- B. Upon completion of the Work and final acceptance by the local authority, CONTRACTOR shall submit Record Drawings to OWNER and ENGINEER under the provisions of Division 01.
- C. Sprinklers shall be referred to on drawings, submittals, and other documentation by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

1.08 TRAINING

- A. Instruct OWNER's personnel in the proper operation, maintenance, and testing of systems and equipment provided as part of this project. Include not less than 8 hours of instruction using the Operation and Maintenance Manuals and Record Drawings during this instruction. Demonstrate testing, start-up, and shutdown procedures for all equipment. All training shall be during normal working hours. Record all instructions and provide OWNER with copy.

1.09 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 FIRE PROTECTION PIPING

- A. Piping Belowground: Ductile iron pressure pipe, mechanical joint, AWWA C111 Class 53, 150 psi working pressure, ANSI/AWWA C151/A21.51. Ductile iron fittings, ANSI/AWWA C111/A21.11. Include cement mortar lining, ANSI AWWA C104 A21.4.

B. Piping Aboveground:

1. Steel Pipe: Black and galvanized steel pipe welded and seamless, Type F, Grade A, ASTM A53; black and galvanized welded and seamless steel pipe for fire protection use, Type F, ASTM A795; electric resistance welded steel pipe, Grade A, ASTM A135. Threaded light wall pipe and plastic pipe are not acceptable.
2. Schedule 40 Type F pipe shall not be used for gasketed mechanical fittings for pipe sizes 2 inches and smaller.
3. Pipe ends shall be grooved in accordance with manufacturer's current listed standards conforming to ANSI/AWWA C-606.
4. Pipe Wall Thickness: Threaded pipe shall have a minimum wall thickness of Schedule 40. All other pipe shall have a minimum wall thickness of Schedule 10. Piping 2 inches and under shall be minimum Schedule 40 unless stated otherwise herein.
5. Fittings: Cast iron pipe flanges and flanged fittings, Class 125/250, ASTM A126/ANSI B16.4. Malleable iron threaded fittings, Class 150/300, ASTM A197/ANSI B16.3. Standard weight seamless carbon steel weld fittings, ASTM A234 grade, ANSI B16.9. Mechanical grooved fittings with EPDM gaskets, ASTM A536 ductile iron, ASTM A47 malleable iron, or ASTM A53 fabricated steel. Fittings on galvanized pipe systems shall be galvanized.
6. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.
7. CPVC Pipe (NEMA 4X Corrosive): Piping located in NEMA 4X corrosive environments shall be Schedule 80 CPVC. Piping shall be listed conforming to ASTM F442. All fittings and components within these spaces shall be CPVC matching piping material.

C. Unions and Flanges:

1. Unions, flanges, and gasket materials shall have a pressure rating of not less than 175 psig.
2. 2-Inch and Smaller Steel: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.
3. 2 1/2-Inch and Larger Steel: ASTM A181 or A105, Class 150, Grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. ANSI B16.1 or ANSI B16.5, Class 150 cast iron threaded flanges. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring or full-face gaskets. Use ANSI B16.1 flat face flanges with full-face gaskets for mating with other flat face flanges on equipment. Provide galvanized flanges on galvanized piping.

D. Mechanical Grooved Pipe Connections:

1. Mechanical grooved pipe couplings and fittings, as manufactured by Victaulic, Anvil, or equal, may be used with cut or roll grooved steel pipe. Couplings and fittings shall be malleable iron ASTM A47, or ductile iron A536 with painted finish. Fittings used on galvanized steel pipe shall have galvanized finish, ASTM A153.
2. All mechanical grooved pipe material including gaskets, couplings, fittings, and flange adapters shall be from the same manufacturer.
3. Grooved joint couplings shall be UL listed and FM approved and shall consist of two ductile iron housing segments conforming to ASTM A536, Grade 65-45-12; pressure responsive center-leg gasket with pipe stop to provide proper groove engagement, alignment, and pipe insertion depth; ASTM A449 compliant bolts and nuts; and utilize a pad-to-pad assembly with visual inspection for verification of proper assembly. Couplings that require exact gapping at specific torque ratings are not

- permitted. Small diameter IGS, or equal, grooved fittings can be on used on sizes 1 inch through 2 1/2 inches instead of threaded steel piping systems.
4. Gaskets shall be prelubricated Grade "E" EPDM Type 'A' gasket with ASTM A449 electroplated steel bolts and nuts. They shall also be UL listed for a working pressure of 300 psi and FM approved for working pressure 365 psi.
 5. "Pipeolets" or similar mechanically attached fittings will not be permitted as fittings. "Weldolets" welded to cross mains in fabrication shops will be permitted as a fitting to supply branch piping only, unless specifically approved for other applications.
 6. Fittings and couplings must be suitable for the temperature and pressure involved. In no case is the final system to have a pressure rating of less than 175 psig.
 7. Acceptable fittings and couplings are listed below, based on Victaulic figure numbers:
 - a. Couplings: Rigid Type couplings, Style 108, 109, 009N, and 107N; standard flexible-type couplings, Style 77 or 177N; or lightweight couplings, Style 75. Reducing couplings are not acceptable.
 - b. Flanges: Flange adaptor, Style 741, except at lug-type butterfly valves where standard threaded flanges shall be used.
 - c. Fittings: Malleable or ductile iron elbows and tees of the manufacturer's standard line may be used in all sizes, except bullhead tees will not be accepted. Mechanical-T Style 920 and 920N fittings with malleable iron housings may be used for up to 2-inch outlet size.
 8. Grooved sprinkler couplings of sizes 1/2 inch by 1 inch, 3/4 inch by 1 inch, and 1 inch by 1 inch may be used instead of threaded fittings to provide a connection to IGS grooved sprinkler outlets using the style V9 sprinkler coupling.

2.02 HANGERS, SUPPORTS AND ANCHORS

- A. General:
 1. Comply with the requirements of applicable NFPA Standards. Hangers shall be UL-listed and FM-approved, unless otherwise specified.
 2. Corrosive Atmosphere Coatings:
 - a. Corrosive environments shall be as noted on the Drawings.
 - b. Pipe in chemical rooms shall be supported with a plastic support system, Aickinstrut, or equal.
 3. Provide all supporting devices as required for the installation of fire suppression equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.
 4. Do not hang any fire suppression system item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.
 5. Fasteners depending on soft lead for holding power or requiring explosive powder actuation will not be accepted.
 6. Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.
- B. Manufacturers: B-Line, Anvil, Tolco, Roof Products & Systems.
- C. Structural Supports: Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the Drawings.

D. Pipe Hangers and Supports:

1. Hangers for Pipe Sizes 1/2-Inch Through 4-Inch:
 - a. Carbon steel, adjustable swivel ring with 3/8-inch min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70.
 - b. Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.
2. Hangers for Pipe Sizes 4-Inch Through 8-Inch:
 - a. Carbon steel adjustable swivel ring with 1/2-inch min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70.
 - b. Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.
3. Hangers for Pipe Sizes 10-Inch and Up: Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.
4. Multiple or Trapeze Hangers: Manufactured steel channel system with manufacturers slotted interlocking pipe clamps with screw/nut securing and threaded hanger rods or steel channels with welded spacers and threaded hanger rods.
5. Wall Support:
 - a. Carbon steel welded bracket with hanger. B-Line 3060 Series, Anvil 190 Series.
 - b. Steel channels with pipe clamps.
6. Vertical Support: Carbon steel riser clamp. B-Line B3373, Anvil 261 for above floor use.
7. Floor Support: Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093.
8. Copper Pipe Supports: All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or polyvinylchloride coated. Where steel channels are used, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series.
9. Pipe Hanger Rods: Steel Hanger Rods:
 - a. Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.
 - b. Size rods for individual hangers and trapeze support as indicated in the following schedule.

Pipe Size	Diameter of Rod
Up to and Including 4"	3/8" or 9.5 mm min.
5", 6", and 8"	1/2" or 12.7 mm min.
10" and 12"	5/8" or 15.9 mm min.

10. Beam Clamps:
 - a. MSS SP-58 Types 19 and 23 malleable black iron clamp for attachment to beam flange to 0.62 inch thick with a retaining ring and threaded rod of 3/8-, 1/2-, and 5/8-inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Anvil 86/92.
 - b. MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1 1/2-inch diameter. B-Line B3054, Anvil 228.
11. Concrete Inserts:
 - a. Poured In Place:
 - (1) MSS SP-58 Type 18 wedge type to be constructed of a black carbon steel body with a removable malleable iron nut that accepts threaded rod to

- 7/8-inch-diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity. B-Line B2505, Anvil 281.
- (2) MSS SP-58 Type 18 universal type to be constructed of black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8-inch-diameter. B-Line B3014N, Anvil 282.
- b. Drilled Fasteners:
- (1) Concrete Construction: Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.
 - (2) Wood Construction: Side or bottom mount lag thread by rod thread one piece hanger attachment installed per the Manufacturers standard and carrying capacity limit. Powers Fastener Vertigo, Erico Hangermate or equal.
12. Continuous Concrete Insert Channels: Steel inserts with an industry standard pre-galvanized finish, nominally 1 5/8-inch by 1 3/8-inch deep by length to suit the application, designed to be nailed to concrete forms and provide a linear slot for attaching other support devices. Installed channels to provide a load rating of 2,000 pounds per foot in concrete. Manufacturer's standard brackets, inserts, and accessories designed to be used with channel inserts may be used. Select insert length to accommodate all pipe sizes in the area.
13. Anchors: Use welding steel shapes, plates, and bars to secure piping to the structure.
14. Equipment Stands: Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

2.03 SPRINKLERS

- A. Manufacturer: Sprinkler head model numbers establish type and style of head. Products of the following manufacturers, determined to be equal by ENGINEER, will be accepted: Tyco, Reliable, Victaulic, and Viking.
- B. Standard coverage sprinkler heads are to be the basis for design unless noted otherwise on the Drawings or within these specifications.
- C. All sprinkler heads shall be UL listed and FM approved, fusible link or glass bulb type, cast brass or bronze construction. Provide heads with nominal 1/2-inch discharge orifice except where greater than normal density requires large orifice.
- D. Select fusible link or glass bulb temperature rating to not exceed maximum ambient temperature rating allowed under normal conditions at installed location and as indicated. Provide ordinary temperature fusible link or glass bulb type except at skylights, sealed display windows, unventilated attics and roof spaces, over cooking equipment, adjacent to diffusers, unit heaters, uninsulated heating pipes or ducts, mechanical rooms, storage rooms, or where otherwise indicated.
- E. Listed corrosion-resistant sprinkler heads shall be installed in locations where chemicals, moisture, or other corrosive vapors sufficient to cause corrosion of such devices exist. Sprinkler heads located in areas listed in design requirements shall be listed corrosion-resistant heads.
- F. Sprinkler Cabinets: Provide cabinets complete with required number of spare heads of each type and temperature rating and special wrenches in accordance with NFPA 13. Provide multiple cabinets as required. Cabinet shall be finished steel suitable for wall mounting with

hinged cover and adequate space for required spare heads and wrenches. Coordinate cabinet location with OWNER's representative. Coordinate quantities with the authority having jurisdiction over the project.

2.04 VALVES

- A. Manufacturers: Kennedy, Milwaukee, Nibco, Stockham, Victaulic, Viking, and Watts.
- B. Isolation Valves 2 Inches and Smaller:
 - 1. Ball Valves: Bronze body, threaded or grooved ends, standard port, blowout-proof stem, chrome-plated ball, glass-reinforced seats, UL approved, 350 psi rating, Victaulic Series 728, or equal.
 - 2. Butterfly Valve: Bronze body butterfly valve, 365 psig, geared operator, visible position indicator, normally open tamper switch with double wire leads, Buna or Viton seat, stainless steel disc and stem, Victaulic Series 765, or equal.
- C. Isolation Valves 2 1/2 Inches and Larger:
 - 1. Gate Valve: UL listed/FM-approved, outside screw and yoke (OS&Y) gate valves, 175 psig, cast or ductile iron body, bronze-mounted, bolted bonnet, rising stem, solid wedge, with normally open tamper switch with double wire leads. Valves shall be capable of being repacked under pressure with valve wide open. Equal to Nibco F-607-OTS or Victaulic Series 771F or 771H.
 - 2. Butterfly Valve: Cast or ductile iron body butterfly valve, lug style or grooved, 250 psig, geared operator, visible position indicator, normally open tamper switch with double wire leads, EPDM resilient seat, EPDM seals, nickel-plated ductile iron disc. Valve assembly to be bubble tight to 175 psig with no downstream flange/pipe attached. Use cap screws for removal of downstream piping while using the valve for system shutoff. Equal to Nibco LD3510-8 or Victaulic Series 705.
- D. Test and Drain Valves:
 - 1. Threaded or grooved bronze globe type with composition disc, 175 psi WOG. Valves shall be equal to Nibco KT-65 for piping assemblies built on site. Victaulic Series UTD or equal may be installed to save space and assembly time.
 - 2. Drain Valves: UL listed, 3/4-inch minimum, two- or three-piece bronze body ball valve; threaded ends, chrome-plated bronze ball; glass-filled Teflon seat; Teflon packing and threaded packing nut; blowout-proof stem; 400 psig WOG. Low point drain valves shall have, in addition, a 1-inch brass nipple with 3/4-inch male hose threads and cap.
 - 3. Combination test, drain, and pressure relief valves:
 - a. Victaulic Series UTD, AGF Model 1011A TESTanDRAIN, or equal.
 - b. Valve shall be UL listed and FM approved.
 - c. 3/4-inch minimum size, bronze body and relief valve, Teflon seat, brass ball, stem, and bypass fittings, braided nylon bypass tubing.
 - d. Orifice size shall be determined by sprinkler heads in system.
 - e. Pressure relief valve shall be factory-rated for 175 psi and field adjustable.
- E. Check Valves: Cast or ductile iron body, flanged or grooved ends, bolted cap, renewable bronze seat and disc, stainless steel clapper with a replaceable rubber seal (a rubber seal integral with the seat is not acceptable), and 175 psig suitable for installation in a horizontal or vertical line with flow upward. Valve equal to Viking Model D or Victaulic Series 717. Provide 1/2-inch automatic drip drain on inlet to fire department connection check valve. Provide full-sized check valve bypass with shutoff valve and tamper switch to facilitate annual testing of backflow preventer.

2.05 BACKFLOW PREVENTER

- A. Manufacturers: Ames, Conbraco, Febco, Watts, Beeco, Cla-Val, Wilkinson.
- B. ASSE 1015 double check backflow preventer with two independent spring-loaded check valves, two isolation ball or gate valves with normally open tamper switches, double wire leads, 4-valved test ports, and lockable valves. Constructed of bronze or epoxy-coated cast iron or stainless steel body with bronze and plastic internal parts, stainless steel springs, silicone rubber valve discs, bronze seats, rated for 175 psig. Size for a minimum pressure drop of 15 psig at 50 gpm.

2.06 ALARM DEVICES

- A. Supervisory/Tamper Switches:
 - 1. Manufacturer: Potter, System Sensor, or equal.
 - 2. For OS&Y valve or butterfly valve installations, UL listed/FM-approved, to monitor position of valve, tamper-resistant cover screws, single or double SPDT switch contacts, corrosion-resistant, for indoor or outdoor use, NEMA 4 and 6P enclosures.
- B. Flow Switches:
 - 1. Manufacturer: Potter, System Sensor, or equal.
 - 2. Flow switches shall be UL listed and FM-approved capable of transmitting a signal when the flow of water equals or exceeds the discharge of a single head. Unit shall be vane type, with retard chamber and electrical characteristics compatible with fire alarm system. Provide flow switches for each riser.
- C. Local Alarm Bell:
 - 1. Manufacturer: Potter, System Sensor, or equal.
 - 2. Weatherproof electric alarm bell with red-painted metal housing, mounting base and gong; solenoid operator; weatherproofing O-ring seal and electrical characteristics compatible with alarm system.

2.07 ACCESSORIES

- A. Fire Department Connection:
 - 1. Manufacturers: All equipment shall be UL listed and FM-approved by Elkhart Brass, Potter-Roemer, Badger-Powhatan, Croker Corp., J.W. Moon, and W.D. Allen.
 - 2. Fire Department Pumper Connection: Pumper connection shall be flush type, cast brass body with drop clappers, polished chrome cover plate with lettering reading "AUTO SPRINKLER." Unit shall include 4 by 2 1/2 by 2 1/2 chrome-plated brass snouts with rigid end threading to match local fire department standards by pin-lug hose thread swivels, pin-lug plugs, and chains. Pumper connection shall be Potter-Roemer Series 5026-D, or equal.
 - 3. Ball Drip: Provide a bronze ball drip for the fire department connection inside of the building and pipe to the nearest floor drain.
- B. Pressure Gauges:
 - 1. Manufacturer: Ametek/U.S. Gauge Division, Ashcroft, Marsh, Taylor, H.O. Trerice, Weiss, Weksler.
 - 2. Cast aluminum, stainless steel, or brass case of not less than 3 1/2 inches in diameter, double-strength glass window, black lettering on a white background, phosphor bronze

bourdon tube with bronze bushings, recalibration from the front of the dial, 99% accuracy over the middle half of the scale, 98.5% accuracy over the remainder of the scale. Include bronze three-way globe valve with plugged outlet for fire inspector's test gauge.

PART 3—EXECUTION

3.01 GENERAL INSTALLATION

- A. Install pipe, fittings, equipment, and components in accordance with referenced standards, manufacturer's recommendations, recognized industry practices, and the authority having jurisdiction.
- B. General Coordination: Install all piping parallel to building walls and ceilings and at heights that do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of fire protection piping with piping, ductwork, conduit, and equipment of other trades to allow sufficient clearances. In all cases, consult Drawings for location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures, and grilles before installing piping.
- C. Where piping must be embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.
- D. Maintain piping, fittings, and fire protection system components in clean condition internally during construction. All material shall be kept at proper temperature to promote proper jointing. Pipe and fittings shall be corresponding materials when assembled.
- E. Provide clearance for access to valve and piping specialties to facilitate maintenance and repair or replacement.
- F. Pipe shall be hung from building members using concrete inserts or beam clamps. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.
- G. Install sprinkler piping so that the system can be drained in accordance with NFPA 13. Where possible, slope to main drain valve. Where piping not susceptible to freezing cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or ball valve with hose thread outlet and cap for drainage over 5 gallons. Pipe main drain valve, inspector's tests, and auxiliary drains to grade or to air gap sewer receptor.
- H. Provide 3/32 inch minimum thickness steel nailing plates behind or on either side of piping where the possibility of penetration from nails or drywall screws exists.
- I. Piping between sprinkler heads and test/auxiliary drain piping shall be galvanized steel to retard or eliminate corrosion because of oxidation in these subsystems. Fittings shall match piping installed such as galvanized fittings on galvanized pipe. Provide dielectric fittings between dissimilar pipe materials.
- J. Mitered ells, notched tees, and orange peel reducers are not acceptable. Bushings and reducing couplings are not acceptable.

- K. Install auxiliary drains at all low points in the system, air vents at all high points in the system, and as required by the referenced standards. Drains and vents shall consist of, as a minimum, a 1-inch ball valve, 1-inch brass nipple with 3/4-inch male hose threads and cap.
- L. Fire Barrier Penetrations: Where pipes pass through fire-rated wall assemblies, partitions, ceilings, or floors, the fire rating integrity shall be maintained.
- M. Do not install piping within exterior walls.
- N. Do not route piping above transformers, panelboards, or switchboards including the required service space for this equipment, unless the piping is serving this equipment.
- O. Floor and Roof Protection:
 - 1. CONTRACTOR shall take extra precautions to protect the floors and roofs from oil spillage and dripping. Any operation, such as cutting and threading of pipe that can result in dripping of oil and thread cuttings, shall be done over a drain pan that will collect all drippings. Tarpaulins, plywood, or drop cloths shall be used around such piping to prevent workers from tracking oil over the area. Workers shall be cautioned about cleaning their feet. Any liquids, such as oil, that will be used in this work shall be kept in tightly stoppered containers; extreme care shall be used when charging equipment with these materials to avoid any spills.
 - 2. All residual matter deposited on floors, roofs, walls, and other surfaces because of the system installation shall be completely removed.

3.02 WELDED PIPE JOINTS

- A. Welded joints shall be made in a fabrication shop. No welding is allowed at the project site.
- B. Make all welded joints by fusion welding in accordance with ASME Codes, ANSI B31, and the 2021 International Building Code where applicable. Electrodes shall be Lincoln, or approved equal, with coating and diameter as recommended by the manufacturer for the type and thickness of work being done.
- C. "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half the diameter of the main.

3.03 THREADED PIPE JOINTS

- A. Joints of threaded pipe shall be made by cutting pipe square and reaming inside. Ream ends of pipe to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly. Threads shall be cut so that exposed threads shall not exceed three. Exposed threads shall be coated with asphaltum. Use joint compound sparingly.
- B. Use a thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.04 MECHANICAL GROOVED PIPE CONNECTIONS

- A. Use pipe factory-grooved in accordance with the coupling manufacturer's specifications or field-grooved pipe in accordance with the same specifications using specially designed tools

available for the application. Lubricate pipe and coupling gasket, align pipe, and secure joint in accordance with the coupling manufacturer's specifications.

3.05 UNIONS AND FLANGES

- A. Install a union, flange, or grooved coupling combination at each connection to each piece of equipment and at other items that may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union or grooved coupling combination connections on the equipment side of the valve. Concealed unions, flanges, or couplings are not acceptable.

3.06 HANGERS, SUPPORTS, AND ANCHORS

- A. Installation:
1. Size, apply and install supports and anchors in compliance with manufacturers recommendations.
 2. Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.
 3. Coordinate hanger and support installation to properly group piping of all trades.
 4. Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.
 5. Perform welding in accordance with standards of the American Welding Society.
 6. Support piping in accordance with NFPA 13, other sections of this specification, and in accordance with all state and local requirements.
 7. Provide hangers to support all piping in perfect alignment without sagging or interference, to permit free expansion and contraction and to meet the requirements of NFPA 13. Strap hangers, wire hangers, or trapeze hangers will not be acceptable.
- B. Hanger and Support Spacing:
1. Use hangers with minimum vertical adjustment.
 2. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.
 3. Support riser piping independently of connected horizontal piping.
 4. Adjust hangers to obtain the slope specified in the piping section of these specifications.
 5. Space hangers for pipe as follows:

Pipe Material	Pipe Size	Maximum Horizontal Spacing	Maximum Vertical Spacing
Copper	3/4" through 1"	8'-0"	10'-0"
Copper	1 1/4" through 1 1/2"	10'-0"	10'-0"
Copper	2" through 3"	12'-0"	10'-0"
Copper	3 1/2" through 8"	15'-0"	10'-0"
Steel	1" through 1 1/4"	12'-0"	15'-0"
Steel	1 1/2" through 8"	15'-0"	15'-0"
Steel	8" through 12"	15'-0"	20'-0"
CPVC	1" through 1 1/4"	6'-0"	10'-0"
CPVC	1 1/2"	7'-0"	10'-0"

Pipe Material	Pipe Size	Maximum Horizontal Spacing	Maximum Vertical Spacing
CPVC	2"	8'-0"	10'-0"
CPVC	2 1/2"	9'-0"	10'-0"
CPVC	3"	10'-0"	10'-0"

6. Hangers, supports and hanger spacing for CPVC plastic piping systems shall conform to the requirements of NFPA 13 and the manufacturer's requirements. CONTRACTOR shall provide details on the installation drawings for all proposed means of support.
7. Restraint hangers shall be installed at all sprinkler head location within 1 foot 0 inches for a single restraint and within 5 feet 0 inches for two points of restraint. The requirements for hanger restraint for systems in excess of 100 psi pressure shall be followed.
8. Hangers for CPVC systems shall not compress, distort, cut or abrade the piping and shall allow free movement of the pipe to permit thermal expansion and contraction.
9. Unsupported length from the last hanger and an end sprinkler for steel piping systems shall be as follows:

1" piping	Not greater than 36"
1 1/4" piping	Not greater than 48"
1 1/2" piping or larger	Not greater than 60"

- C. Riser Clamps: Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor. Use method of securing the vertical risers to the building structure below in stairwell locations.
- D. Anchors: Install where indicated on the Drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.07 SPRINKLER HEADS

- A. Install sprinkler heads as recommended by manufacturer. Locate sprinkler heads as indicated on fire protection plan and reflected ceiling plan maintaining minimum clearances from obstructions, ceilings, and walls. Install sprinkler heads level in locations not subject to spray pattern interference. When ducts, lights, or other objects are obstructions to sprinkler distribution, additional heads shall be provided beneath the obstruction.
- B. All sprinkler heads installed in finished ceilings shall be fed by a swing joint or return bend arrangement for final positioning in ceiling grid pattern during construction phases.
- C. All sprinkler heads shall be centered in ceiling tile.

3.08 GAUGES

- A. Provide a valved pressure gauge in main fire protection riser, at or near each test connection, and at the top of each piping riser. Provide gauge with a connection having a soft metal seated globe valve arranged for draining pipe between gauge and valve. Install gauges to permit removal and where they will not be subject to freezing.

3.09 VALVES

- A. Properly align piping before installation of valves. Do not support weight of piping system on valve ends. Mount valves in locations that allow access for operation, servicing, and replacement. Install all valves with the stem in the upright or horizontal position. Valves installed with the stems down will not be accepted. Provide a riser shutoff valve and a capped hose thread drain valve at the bottom of each riser. Provide capped hose thread drain valves to allow draining of each portion of piping.
- B. Install supervised-open gate valves located to control all sources of water supply except fire department connections.
- C. Provide permanently marked identification signs indicating the portion of the system controlled by each valve.
- D. Provide tamper switch on each shutoff valve where noted on the Drawings.
- E. Install locking device with each shutoff valve to prevent inadvertent closing of the valve. Keys shall be indexed to identify valve location.

3.10 FIRE DEPARTMENT CONNECTIONS

- A. Fire department connections will be installed in the same location as the double check valve assembly. Mount on wall where indicated and/or as required. Support from structure independent of piping. Locate between 2 feet to 3 feet above grade. Fill wall penetration with insulation and caulk exterior and interior face of wall opening weathertight.
- B. Provide 1/2-inch automatic drip drain on inlet of fire department connection check valve and where indicated.

3.11 TEST CONNECTIONS

- A. Install test connections sized and located in accordance with NFPA Standards, complete with shutoff valve. Test connections may also serve as drain pipes.
- B. Provide test connections for each flow switch. Test connections shall discharge to appropriate receptacles.
- C. When test valves are located remote from the flow switch, the valve shall be identified with a brass tag denoting which flow switch is being tested.

3.12 FIRE ALARM SYSTEMS

- A. CONTRACTOR shall coordinate their work with the Fire Alarm System Contractor. The system (Fire Alarm and Fire Protection) must be compatible as listed in the Factory Mutual Research Approval Guide.

3.13 TESTING

- A. Flush, test, and inspect sprinkler piping systems in accordance with NFPA 13.

- B. The sprinkler system shall be tested as an entire system or partial system. The system shall be hydrostatically tested at 200 psi for 2 hours. No leakage allowed. All defective joints shall be replaced with new materials. No caulking of defective joints shall be allowed. After defective joints are replaced, the system shall be retested until satisfactory results are obtained. Pipe shall not be concealed until satisfactorily pressure-tested.
- C. ENGINEER and OWNER shall be notified 24 hours prior to any pressure test. This test shall be performed in the presence of appropriate representatives for OWNER and ENGINEER. A log of tests shall be kept stating who performed test, time and date of test, what section of system was tested, and results of test with properly executed Contractor's Material and Test Certification forms from NFPA 13. This log shall be kept at the job site and submitted to ENGINEER for review.
- D. Flow switches shall be operated to test that proper signals are transmitted to the Fire Alarm System.
- E. Include tests for tamper switches.

3.14 IDENTIFICATION

- A. Provide system identification as noted in Section 20 05 53—Identification for Fire Suppression, Plumbing, and HVAC Piping and Equipment.
- B. Identify equipment with engraved nameplates.
- C. Identify interior piping mains not less than once every 25 feet, not less than once in each room, adjacent to each access door or panel, and on both sides of the partition where exposed piping passes through walls or floors. Place flow directional arrows at each identification location.
- D. Identify valves with signs according to NFPA rulings.
- E. Provide a hydraulic design information sign of permanently marked weatherproof metal or engraved nameplate material. Secure to alarm valve with brass chain or nylon wire ties. Information shall include location of the design areas. Include discharge densities, required flow and residual pressure at base of the riser, hose stream demand, square footage of area protected, and fire sprinkler head demand.

END OF SECTION

SECTION 22 05 19

GENERAL PLUMBING PIPING SPECIALTIES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Piping specialties for all plumbing piping systems unless noted otherwise.
- B. Related Sections and Divisions: Applicable provisions of Division 01 govern work under this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within this specification.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New start-up shall be for the purpose of determining alignment, lubrication, voltage, and amperage readings. New start-up shall confirm all proper electrical connections, discharge, and suction gauge readings. A copy of the start-up report shall be made and sent to both CONTRACTOR and ENGINEER.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.
- C. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.
- D. Submit manufacturer's installation instructions.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.
- B. Include replacement and spare parts lists.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 THERMOMETERS

- A. Manufacturers: Ashcroft, H.O. Trerice, Ametek/U. S. Gauge.
- B. Stem Type: Cast aluminum case, 9-inch scale, clear acrylic window. Adjustable angle brass stem with stem of sufficient length so the end of the stem is near the middle of a pipe without reducing the thickness of any insulation, red indicating fluid, black lettering against a white background, with scale ranges as follows:

Service	Hot Water
Scale Range, °F	30-180
Increment, °F	2

2.02 THERMOMETER SOCKETS

- A. Brass with threaded connections suitable for thermometer stems and temperature control sensing elements in pipeline. Furnish with extension necks for insulated piping systems.

2.03 WATER HAMMER ARRESTORS

- A. Manufacturer: Sioux Chief, Wade, or Watts.
- B. ANSI A112.26.1, ASSE 1010; sized in accordance with PDI WH-201, precharged piston type constructed of hard drawn Type K copper, threaded brass adapter, brass piston with O-ring seals, FDA-approved silicone lubricant, suitable for operation in temperature range 35 to 150°F, maximum 250 psig working pressure, 1500 psig surge pressure. Watts Series LF15M2 or LF15M2S, or equal.

2.04 BACKFLOW PREVENTERS

- A. Backflow Preventers (Double Check Valve Assembly):
 - 1. The assembly shall meet the requirements of ASSE 1015 and AWWA C510.
 - 2. Top entry access points for each check assembly.
 - 3. Replaceable seats.
 - 4. Test cocks.
 - 5. Rated 175 psi maximum working pressure with continuous temperature range of 33°F to 140°F.
 - 6. Sizes 1/2 inch through 2 inches: Bronze alloy body, bronze strainer, upstream and downstream quarter-turn ball valves, union connections: Watts Regulator Company, Series LF719.
 - 7. Sizes 2 1/2 inches through 10 inches: FDA epoxy-coated cast iron body, FDA epoxy-coated strainer, upstream and downstream OSY-UL/FM outside stem and yoke resilient seated gate valves, flange connections: Watts Regulator Company Series LF709.

2.05 WALL HYDRANTS

- A. Manufacturer: Watts, Woodford, or Zurn.

- B. WH-1: Freezeproof automatic draining wall hydrant with exposed chrome plated bronze wall plate, 3/4-inch inlet, 3/4-inch hose thread ASSE 1019-93 backflow preventer outlet, copper or bronze casing, loose key operator. Woodford model 65, or equal.

2.06 HOSE BIBBS

- A. Manufacturer: Woodford, Watts, or Wade.
- B. HB-1: Hose bibbs shall be Woodford Model 24, Watts, HB-1, or Wade HB-1. Provide 3/4-inch garden hose thread, 3/4-inch inlet, and ASSE 1011 approved backflow preventer outlet. Interior hose valves shall be equipped with approved vacuum breaker, Watts 8A, Nidel Model 34H, or equal. Provide metal handle and chrome plate finish. Hose bibbs providing non-potable water shall be provided with a removable key handle.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install thermometer in piping systems as indicated on the Drawings and/or details using a separable socket in each location.
- B. Install thermometer sockets at each point where a thermometer or temperature control sensing element is located in a pipeline.
- C. Install backflow preventers in accordance with Illinois Plumbing Code requirements maintaining minimum clearance distances for servicing and testing. Provide indirect waste piping with air gap installation from relief opening to above hub drain or floor drain.
- D. Mount wall hydrants recessed in exterior wall construction with valve plug extended beyond interior side of building insulation. Slope to drain to exterior. Install so discharge is 18 inches minimum above finished grade. Set wall box in grout or caulk and fill exterior wall penetration with insulation.
- E. Install water hammer arrestors where indicated and at quick-closing valve installations.
- F. Mount hose bibbs securely fastened to wall where indicated. Provide water hammer arrestor in line to hose bibb. Hose bibbs providing non-potable water shall be provided with non-potable water warning signage as outlined in this section.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Valves of all descriptions except where indicated elsewhere.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within this specification.

1.03 QUALITY ASSURANCE

- A. Quality assurance shall be in accordance with Section 01 45 00–Quality Control.

1.04 SYSTEM DESCRIPTIONS

- A. Performance Requirements:
 - 1. Lead-Free Requirements: All materials that contact potable water shall be lead free. Lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per the Federal Safe Drinking Water Act as amended January 4th, 2011 Section 1417. All products used in potable water systems shall be UL classified in accordance with ANSI/NSF 61 for potable water service and shall meet the low lead requirements of NSF-372.
 - 2. Where valve types (ball, butterfly, etc.) are specified for individual plumbing services (i.e., domestic water, gas, etc.), each valve type shall be of the same manufacturer unless prior written approval is obtained from OWNER.
 - 3. Valves shall be line size unless specifically noted otherwise.

1.05 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Schedule of all valves indicating type of service, dimensions, materials of construction, and pressure/temperature ratings for all valves shall be used on the project. Temperature ratings specified are for continuous operation.

1.06 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under Section 01 33 00–Submittals.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 WATER SYSTEM VALVES (CWS, DHWS, DHWR, TMW, TMWR)

- A. All water system valves to be rated at not less than 125 psig water working pressure at 240°F unless noted otherwise.
- B. Provide valve extensions for valves installed in all piping with insulation.
- C. All local shutoff valves serving emergency eyewash and shower stations shall be lockable.
- D. All valves on potable water supplies shall be suitable for potable water applications.
- E. Shutoff valves in CPVC piping 3 inches in diameter and smaller shall be hand-operated 150 psi CPVC ball valves, Chemtrol TU Series Tru-bloc, Hayward, Walworth, or equal. Valves and all components shall be suitable for potable water applications.
- F. Shutoff valves in copper piping 3 inches in diameter and smaller shall be two-piece bronze body, solder joint or threaded ends, chrome plated bronze ball, glass filled Teflon seat, Teflon packing and threaded packing nut, blowout-proof stem, 600 psi. Apollo 70LF-200, Milwaukee UPBA150, Nibco S580-80-LF.
- G. Check valves in copper piping 3 inches in diameter and smaller shall be bronze body, wye pattern, swing check, with bronze disc, rated for 300 psig CWP, and NSF certified lead free Apollo valves 161S-LF, or equal.

- H. Potable Water Circuit Setters/Balance Valves:
 - 1. Manufacturers: Bell and Gossett, or equal.
 - 2. Valve shall be designed to allow installing contractor to pre-set balance points for proportional system balance prior to system start-up.
 - 3. All valves shall be of Lead-Free Brass body and stainless steel ball construction with glass and carbon filled TFE seat rings.
 - 4. Valves shall have differential pressure read-out ports across valve seat area. Read-out ports shall be fitted with internal EOT inserts/check valves. Valve bodies shall have 1/4-inch NPT tapped drain/purge ports.
 - 5. Valves shall have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves shall have calibrated nameplates to provide specific valve settings. Valves shall be designed for positive shut-off.
 - 6. Valves shall be suitable for 400 psi service up to 250°F.
- I. Drain Valves: 3/4-inch ball valve with integral threaded hose adapter, sweat or threaded inlet connections, with threaded cap and chain on hose threads, Apollo 70LF-200-HC, Milwaukee BA-100H or BA-150H, or Nibco T-585-70-HC.

2.02 SPECIALTY VALVES AND VALVE ACCESSORIES

- A. Gauge Valves: Use 1/4-Inch ball valves. Needle valves and gauge cocks will not be accepted.

PART 3—EXECUTION

3.01 GENERAL

- A. Properly align piping before installation of valves. Install and test valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.
- B. Mount valves in locations which allow access for operation, servicing, and replacement.
- C. Provide valve handle extensions for all valves installed in insulated piping.
- D. Install all valves with the stem in the upright or horizontal position. If possible, install butterfly valves with the stem in the horizontal position. Valves installed with the stems down will not be accepted.
- E. Prior to flushing of piping systems, place all valves in the full-open position.

3.02 SHUT-OFF VALVES

- A. Install shut-off valves at each piece of equipment, at each branch take-off from mains for isolation or repair and elsewhere as indicated.

3.03 BALANCING VALVES

- A. Install where indicated on the Drawings and details for balancing of flow in pumped hot water recirculation piping systems.
- B. Upon project completion, adjust each valve and set position stop. Balance system to minimum flow in return piping branches needed to maintain even supply water temperature throughout building.

3.04 DRAIN VALVES

- A. Provide drain valves for complete drainage of all systems. Locations of drain valves include low points of piping systems, downstream of riser isolation valves, equipment locations specified or detailed, other locations required for drainage of systems and elsewhere as indicated.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Hangers and supports for Plumbing Piping and Equipment.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within this specification.

1.03 QUALITY ASSURANCE

- A. Quality assurance shall be in accordance with Section 01 45 00—Quality Control.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.

1.05 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under Section 01 33 00—Submittals.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 MANUFACTURERS

- A. Anvil, B-Line, Pate, G-Strut, Piping Technology, Roof Products & Systems or approved equal.

2.02 STRUCTURAL SUPPORTS

- A. Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the Drawings.

2.03 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2-Inch through 2 Inches:
 - 1. Carbon steel, adjustable swivel ring. B-Line B3170, Anvil 69 or 70.
 - 2. Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.
- B. Hangers for Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support:
 - 1. Carbon steel welded bracket with hanger. B-Line B3068 Series, Anvil 194 Series.
 - 2. Perforated, epoxy painted finish, 16-12 gauge, minimum, steel channels securely anchored to wall structure, with interlocking, split-type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000 series clamps, Anvil type AS 200 H with AS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series.
- E. Vertical Support: Carbon steel riser clamp. B-Line B3373, Anvil 261 for above floor use.
- F. Floor Support: Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093.
- G. Copper Pipe Supports: All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or polyvinylchloride coated. Where steel channels are used, provide isolation collar between supports/clamps/fasteners and copper piping.

2.04 PIPE HANGER RODS

- A. Steel Hanger Rods:
 - 1. Hanger rod shall be continuously threaded, complete with adjusting and lock nuts.
 - 2. Size rods for individual hangers and trapeze support as indicated in the following schedule.
 - 3. Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, shall not exceed the limits indicated.

Maximum Load (pounds)	Rod Diameter (inches)
(650°F Maximum Temperature)	
610	3/8
1,130	1/2
1,810	5/8
2,710	3/4
3,770	7/8
4,960	1
8,000	1 1/4

2.05 BEAM CLAMPS

- A. MSS SP-58 Types 19 and 23 malleable black iron clamp for attachment to beam flange to 0.62 inch thick with a retaining ring and threaded rod of 3/8-, 1/2-, and 5/8-inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Anvil 86/92.
- B. MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1 1/2-inch diameter. B-Line B3054, Anvil 228.

2.06 CONCRETE INSERTS

- A. Poured in Place:
 - 1. MSS SP-58 Type 18 wedge type to be constructed of a black carbon steel body with a removable malleable iron nut that accepts threaded rod to 7/8-inch diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity. B-Line B2505, Anvil 281.
 - 2. MSS SP-58 Type 18 universal type to be constructed of black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8-inch diameter. B-Line B3014N, Anvil 282.
- B. Drilled Fasteners: Carbon steel drop-in type expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

2.07 ANCHORS

- A. Use welding steel shapes, plates, and bars to secure piping to the structure.

2.08 EQUIPMENT STANDS

- A. Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

2.09 CORROSIVE ATMOSPHERE COATINGS:

- A. Corrosive environments shall be as noted on the Drawings.
- B. Pipe in chemical rooms shall be supported with a plastic support system, Aickinstrut, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Size, apply and install supports and anchors in compliance with manufacturers recommendations.
- B. Install supports to allow free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.
- C. Coordinate hanger and support installation to properly group piping of all trades.
- D. Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.
- E. Size and install hangers and supports, except for riser clamps, for installation on the exterior of piping insulation. Where a vapor barrier is not required, hangers may be installed either on the exterior of pipe insulation or directly on piping.
- F. Perform welding in accordance with standards of the American Welding Society.

3.02 HANGER AND SUPPORT SPACING

- A. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
- B. Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.
- C. Use hangers with 1 1/2-inch minimum vertical adjustment.
- D. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.
- E. Support riser piping independently of connected horizontal piping.
- F. Adjust hangers to obtain the slope specified in the piping section of these specifications.

G. Space hangers for pipe as follows:

Pipe Material	Pipe Size	Maximum Horizontal Spacing	Maximum Vertical Spacing
Copper	1/2" through 3/4"	5'-0"	10'-0"
Copper	1" through 1 1/4"	6'-0"	10'-0"
Copper	1 1/2" through 2 1/2"	8'-0"	10'-0"
Copper	3"	10'-0"	10'-0"
PVC	All	4'-0"	10'-0"
CPVC	All	4'-0"	10'-0"

* The maximum horizontal spacing for supports may be increased to 10 feet when 10-foot lengths of pipe are employed.

H. Any piping materials not explicitly listed above shall have pipe support provided at maximum spacing intervals as noted in the applicable code or manufacturer recommendations, whichever is more restrictive.

3.03 RISER CLAMPS

A. Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor.

3.04 CONCRETE INSERTS

A. Select size based on the manufacturer's stated load capacity and weight of material that will be supported. Locate continuous insert channels on 6 feet 0 inch maximum centers and 2 feet 0 inches from corners. Furnish inserts to Division 03 for placement in concrete formwork. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4-inch size. Where concrete slabs form finished ceiling, provide inserts that are flush with the slab surface.

3.05 ANCHORS

A. Install where indicated on the Drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs between expansion loops. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION

SECTION 22 07 16

EQUIPMENT INSULATION FOR PLUMBING

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes insulation for all equipment provided under Division 22—Plumbing:
 - 1. Flexible Closed Cell Insulation.
 - 2. Adhesives, Mastic, Sealants, and Reinforcing Materials.
 - 3. Jacketing.
 - 4. Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASTM B117—Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM C168—Standard Terminology Relating to Thermal Insulation.
 - 3. ASTM C518—Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM C591—Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - 5. ASTM C1427—Standard Specification for Extruded Preformed Flexible Cellular Polyolefin Thermal Insulation in Sheet and Tubular Form.
 - 6. ASTM D1000—Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
 - 7. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. ASTM E96—Standard Test Methods for Water Vapor Transmission of Materials.
 - 9. FED L-P-535E: Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) And Poly (Vinyl Chloride-Vinyl Acetate), Rigid.
 - 10. EPA Method 8260B—Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (Gc/Ms).
 - 11. NFPA 262—Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, and fitting materials, along with safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All insulation or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.
- C. Insulation systems shall be applied by experienced contractors. Within the past five years, CONTRACTOR shall be able to document the successful completion of a minimum of three projects of at least 50% of the size and similar scope of the work specified in this section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in accordance with Section 01 60 00–Materials and Equipment.
- B. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage.
- C. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- D. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- E. Use all means necessary to protect insulation before, during, and after installation.
- F. All scratched, dented, and otherwise damaged insulation shall be repaired or replaced without additional cost to OWNER.

1.06 GENERAL REQUIREMENTS

- A. Unless otherwise indicated, all equipment covering, jackets, insulation, vapor barriers, adhesive, and mastics shall have flame spread rating of 25 or less and smoke spread rating of 450 or less when tested in accordance with ASTM E84.
- B. Exposed insulation with All Service Jacketing shall be painted in accordance with Section 09 91 00–Painting. In lieu of painting All Service Jacket insulation, CONTRACTOR may provide PVC jacketing as specified herein. CONTRACTOR shall not paint PVC jacketing. Where painted insulation transitions to PVC jacketing, CONTRACTOR shall coordinate colors with OWNER. Colors shall be in accordance with Section 20 05 53–Identification for Fire Suppression, Plumbing, and HVAC Piping and Equipment.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with

each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 FLEXIBLE CLOSED CELL INSULATION

- A. Acceptable manufacturers are K-flex Insul-tube, Nomaco ArcticFlex, or equal.
- B. Insulation shall be flexible closed cell type conforming to ASTM C1427, Type 1, Grade 1.
- C. Minimum nominal density shall be between 3 to 6 lbs/ft³.
- D. K-factor shall not exceed 0.25 (btu-in)/(hr-ft²-°F) at 75°F mean.
- E. Insulation shall be rated for service range of -20°F to 220°F on piping or 180°F where adhered to equipment.

2.02 ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

- A. Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.

2.03 ACCESSORIES

- A. All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
- C. Insulation bands shall be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness shall be 0.015 inch for aluminum and 0.010 inch for stainless steel.
- D. Staples shall be clinch style.
- E. Tack fasteners shall be stainless steel ring grooved shank tacks.
- F. Joint sealants and metal jacketing sealants shall be non-shrinking and permanently flexible.

PART 3-EXECUTION

3.01 GENERAL

- A. All insulation damaged during construction shall be replaced in accordance with these specifications.
- B. All insulation shall be applied in accordance with the manufacturer's written recommendations. Destructive methods such as sheet metal screws are not acceptable. All insulation shall be installed with joints butted firmly together.
- C. All valves shall be insulated with mitered sections of insulation equal in density and thickness to adjoining insulation or with "Zeston"-type, premolded PVC fittings installed in accordance with the manufacturer's instructions.
- D. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.

3.02 VAPOR BARRIER INSTALLATION

- A. For systems operating at 50°F or above, jackets on insulation may be stapled using outward clinch staples spaced 3 inches apart at least 1/4-inch in from the lap edge.
- B. For systems operating below 50°F, laps shall be vapor-sealed using self-sealing lap, lap-seal tape gun, or adhesive.
- C. Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.
- D. Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.
- E. All insulation ends shall be tapered and sealed regardless of service.
- F. Vapor barrier jackets shall be applied with a continuous, unbroken vapor seal. Vapor barrier jackets shall not be broken at supports.
- G. Vapor retarding jacket shall be maintained continuously through all penetrations.

3.03 FLEXIBLE CLOSED CELL INSULATION INSTALLATION

- A. Miter cut fittings allowing sufficient length to prevent stretching. Completely seal seams and joints for vapor tight installation. Apply full bed of adhesive to both surfaces. Cover flexible closed cell insulation on systems operating below 40°F with vapor retarding mastic.

3.04 EQUIPMENT INSULATION

- A. Insulation shall not cover equipment access manholes, fittings, nameplates or ASME stamps. Bevel and seal insulation at these locations.

B. Provide insulation on equipment as outlined in the following schedule:

Equipment	Insulation	Jacket	Thickness
Water Meters	Flexible Closed Cell	N/A	0.5"
Reduced Pressure Backflow Preventers	Flexible Closed Cell	N/A	0.5"

END OF SECTION

SECTION 22 07 19

PIPING INSULATION FOR PLUMBING

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes insulation for all piping provided under Division 22—Plumbing.
 - 1. Rigid Formed Fiberglass Insulation.
 - 2. Adhesives, Mastic, Sealants, and Reinforcing Materials.
 - 3. Jacketing.
 - 4. Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASTM C168—Standard Terminology Relating to Thermal Insulation.
 - 2. ASTM C272—Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
 - 3. ASTM C518—Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM C533—Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
 - 5. ASTM C547—Standard Specification for Mineral Fiber Pipe Insulation.
 - 6. ASTM C591—Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - 7. ASTM C612—Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 8. ASTM C871—Standard Test Method for Chemical Analysis of Thermal Insulation Materials.
 - 9. ASTM C1427—Standard Specification for Extruded Preformed Flexible Cellular Polyolefin Thermal Insulation in Sheet and Tubular Form.
 - 10. ASTM D1000—Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
 - 11. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 12. ASTM E96—Standard Test Methods for Water Vapor Transmission of Materials.
 - 13. FED L-P-535E: Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) And Poly (Vinyl Chloride-Vinyl Acetate), Rigid.
 - 14. NFPA 262—Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00–Submittals.
- B. Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, and fitting materials, along with safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All insulation or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.
- C. Insulation systems shall be applied by experienced contractors. Within the past five years, CONTRACTOR shall be able to document the successful completion of a minimum of three projects of at least 50% of the size and similar scope of the work specified in this section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in accordance with Section 01 60 00–Materials and Equipment.
- B. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage.
- C. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- D. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- E. Use all means necessary to protect insulation before, during, and after installation.
- F. All scratched, dented, and otherwise damaged insulation shall be repaired or replaced as requested by OWNER without additional cost to OWNER.

1.06 GENERAL REQUIREMENTS

- A. Unless otherwise indicated, all pipe covering, jackets, insulation, vapor barriers, adhesives, and mastics shall have flame spread rating of 25 or less and smoke spread rating of 450 or less when tested in accordance with ASTM E84.
- B. All insulation and associated materials shall be free of asbestos.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 RIGID FORMED FIBERGLASS INSULATION

- A. Acceptable manufacturers are Johns Manville Micro-Lok, or equal.
- B. Insulation shall be mineral fiber type conforming to ASTM C547, Type IV.
- C. Minimum nominal density shall be of 3.0 lbs/ft³.
- D. K-factor shall not exceed 0.23 (btu-in)/(hr-ft²-°F) at 75°F mean.
- E. Insulation shall be rated for service to 850°F.

2.02 ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

- A. Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.
- B. PVC Jacket Adhesive—Acceptable Manufacturers: DOWSIL™ 739 Plastic Adhesive by Dow; Zeston Perma-Weld by Johns Manville; and Ceel-Tite® Solvent Welding Adhesive by Ceel-Co.
- C. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 INSULATION INSERTS AND PIPE SHIELDS

- A. Acceptable manufacturers are B-Line, Pipe Shields, or Value Engineered Products.
- B. Construct inserts with calcium silicate or polyisocyanurate with minimum 140 psi compressive strength. Piping 12 inches and larger shall be supplemented with high-density, 600 psi, structural calcium silicate insert. Provide 16-gauge galvanized steel shield, 12 inches long. Insert and shield shall include minimum 180 degree coverage on bottom

supported piping and full 360-degree coverage on clamped piping. On roller-mounted piping and piping designed to slide on support, provide additional load distribution stainless steel plate.

- C. Where CONTRACTOR proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges, and lengths for each pipe size to demonstrate equivalency to pre-engineered/premanufactured product described above. On low temperature systems, high-density, rigid polyisocyanurate may be substituted for calcium silicate provided insert and shield length and shield gauge are increased to compensate for lower insulation compressive strength.
- D. Wood blocks will not be accepted.
- E. All pipe shields shall be banded to the jacketing using stainless steel bands. One band is required on each side of the support.

2.04 JACKETING

- A. PVC Jackets (PVJ):
 - 1. PVC film, gloss finish one side, semi-gloss other side.
 - 2. In water treatment, water distribution, or food processing facilities, PVC film shall conform to FED L-P-535E, Composition A, Type II, Grade NT.
 - 3. Jacket thickness shall be minimum 0.03 inch.
- B. ADA Accessible Lavatory Insulation: Provide Truebro, Inc. Lav-Guard, or equal, undersink piping cover. Piping cover shall meet applicable ADA requirements. The P-trap, angle valve assemblies, supply piping, and tailpiece shall be covered with the molded vinyl, antimicrobial pipe cover. Cover shall be secured with flush reusable fasteners; angle stop shall have locking access cover.

2.05 ACCESSORIES

- A. All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
- C. Insulation bands shall be 3/4 inch wide, constructed of aluminum or stainless steel. Where metal jackets are used, band material shall match jacket material. Minimum thickness shall be 0.015 inch for aluminum and 0.010 inch for stainless steel.
- D. Load distributing metal shields shall be constructed of aluminum or stainless steel. Where metal jackets are used, shield material shall match jacket material. Minimum thickness shall be 0.015 inch for aluminum and 0.010 inch for stainless steel.
- E. Staples shall be clinch style.
- F. Tack fasteners shall be stainless steel ring grooved shank tacks.
- G. Joint sealants and metal jacketing sealants shall be non-shrinking and permanently flexible.

PART 3-EXECUTION

3.01 GENERAL

- A. All insulation damaged during construction shall be replaced in accordance with these specifications.
- B. All insulation shall be applied in accordance with the manufacturer's written recommendations. Destructive methods such as sheet metal screws are not acceptable. All pipe insulation shall be installed with joints butted firmly together.
- C. All valves and fittings shall be insulated with mitered sections of insulation equal in density and thickness to adjoining insulation.
- D. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.
- E. All pipe insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required.
- F. All un-insulated penetrations through the insulation system shall be insulated along their length to a minimum distance of four times the insulation thickness. To prevent moisture migration behind the insulation, these penetrations shall be sealed with a sealant as recommended by the manufacturer and flashed to shed water.

3.02 SUPPORT INSTALLATION

- A. For each pipe hanger, provide a hanger block on the bottom half of the pipe in place of the insulation.
- B. Pipe hangers and supports shall be sized large enough to be installed over the outer surface of the insulation.
- C. Load distributing metal shields shall be installed around the lower one-third circumference of the insulation and jacket.
- D. Blocks and shields shall be provided at all supports regardless of orientation, except inserts may be omitted on 3/4 inch and smaller copper piping provided 12-inch long 22 gauge pipe shields are used.

3.03 RIGID FORMED FIBERGLASS INSULATION INSTALLATION

- A. Fittings, valves, unions, flanges, couplings and specialties shall be insulated with factory molded insulation of the same thickness as adjoining insulation. Secure insulation sections with two wraps of nylon filament tape 9-inch to 12-inch on center. On single insulation layer systems and on the outer layer of double insulation layer systems, apply a thin coat of flexible closed cell joint sealant rated for system operating temperatures to all longitudinal and butt insulation joints covering entire face of joint. Allow sealant to fully cure before applying protective covering. Where two layers of insulation are used, do not use sealant on the inner layer or adhere the inner layer to the outer layer. Apply vapor stop bead of joint sealant between pipe and insulation on both sides of valves, expansion/contraction joints, flanges,

thermometers/gauges, attached vent and drain lines. Insulate attached non-circulated lines, control lines, vents, etc., for a minimum distance of 6 inches from pipe. Cover insulation with a protective jacket as specified below. Do not penetrate protective covering or insulation with mechanical fasteners.

3.04 PROTECTIVE JACKET INSTALLATION

- A. PVC Fitting Covers and Jackets (PVJ): Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4 inches without fasteners where required to absorb expansion and contraction. For sections where vapor retarding jacket is not required and jacket requires routine removal, tack fasteners may be used. Secure PVC fitting covers with tack fasteners. For systems requiring a vapor retarding jacket, apply a 1 1/2-inch band of mastic over ends, throat, seams and penetrations.
- B. Vapor Barriers:
 1. On systems operating at 50°F and above, pipe insulation jackets may be stapled using outward clinch staples spaced 3 inches apart at least 1/4 inch in from the lap edge. Mastics used shall be "breather" type allowing passage of water vapor.
 2. On systems operating below 50°F and on roof drain lines, insulation laps shall be vapor-sealed using self-sealing lap, lap-seal tape gun, or adhesive. Jackets shall be applied with a continuous unbroken vapor seal. Mastics and adhesives used shall be vapor retarding type limiting passage of water vapor.

3.05 PIPING INSULATION

- A. Provide insulation on new piping as indicated in the following schedule:

SERVICE	INSULATION	JACKET	INSULATION THICKNESS BY PIPE SIZE				
			< 1"	1" to < 1 1/2"	1 1/2" to < 4"	4" to < 8"	8" and Larger
Cooling Coil Condensate Drain	Rigid Formed Fiberglass	PVJ	1"	1"	1"	1"	1"
Cold Water (Potable/Nonpotable)	Rigid Formed Fiberglass	PVJ	1"	1"	1"	1"	1"
Hot Water (Potable/Nonpotable)	Rigid Formed Fiberglass	PVJ	1"	1"	1.5"	1.5"	1.5"

- B. For systems with operating fluid temperatures 65°F or less, furnish and install removable flexible closed cell insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel. Covers shall be tight fitting to provide a complete vapor retarding barrier. Examples include but are not limited to:
 1. Circuit setters.
 2. Drain valves.
 3. Equipment labels.

END OF SECTION

SECTION 22 11 00

FACILITY WATER DISTRIBUTION PIPING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: All pipe, fittings, and appurtenances for domestic (hot and cold) potable and non-potable water within and to 5 feet beyond building perimeter.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work under this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within this specification.

1.03 QUALITY ASSURANCE

- A. Order all pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.
- B. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to OWNER.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. CONTRACTOR shall provide schedule indicating the ASTM, AWWA, or CISPI specification number of the pipe being proposed along with its type and grade if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.
- C. CONTRACTOR shall provide statement from manufacturer on their letterhead that pipe furnished meets the ASTM, AWWA, or CISPI specification contained in this section.

1.05 DELIVERY AND STORAGE

- A. CONTRACTOR shall promptly inspect shipments to review that the material is undamaged and complies with specifications.
- B. CONTRACTOR shall cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Materials shall not be stored directly on grade. Pipe, tube, and fitting ends shall be protected so they are not damaged. Where end caps are provided or specified, CONTRACTOR shall take precautions so the caps remain in

place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

- C. Offsite storage agreements will not relieve CONTRACTOR from using proper storage techniques.
- D. Deliver, store, and protect in accordance with Section 01 60 00—Materials and Equipment.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 DOMESTIC WATER (DCWS, DHWA, DHWR, TMW)

- A. Copper Piping and Fittings: Piping smaller than 3 inches in diameter shall be Type K copper water tube, H (drawn) temper, ASTM B88; wrought copper pressure fittings, ANSI B16.22; lead free (<.2%) solder, ASTM B32; flux, ASTM B813; copper phosphorous brazing alloy, AWS A5.8 BCuP. Mechanically formed brazed tee connections may be used in lieu of specified tee fittings for branch takeoffs up to one-half the diameter of the main.
- B. CPVC Piping:
 - 1. Piping shall be located in NEMA 4X (corrosive) environments and where called out on Drawings.
 - 2. CPVC material used in manufacturing piping and fittings shall conform to ASTM D1784, Class 23447.
 - 3. CPVC piping shall be CPVC 4120, Schedule 80, high-impact conforming to ASTM F441. Piping and fittings shall be approved for use by the National Sanitation Foundation. All pipe delivered to the jobsite shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided as required. In general, all joints shall be solvent weld, except where flanges are shown or called out on the Drawings. All piping shall be supported at spacing not exceeding that recommended by the manufacturer.
 - 4. Solvent cement for CPVC piping shall be specifically designed for piping systems receiving chemical resistance. Cement shall be Oatey EP42, IPS Weld-On ZZ724, or equal.
 - 5. CPVC Schedule 80 pressure fittings shall meet requirements of ASTM F437 (threaded type) and ASTM F439 (solvent weld socket type). All internal threads shall be

machine-taped to the requirements of ANSI/ASME B1.20.1. The quick burst strength of the fittings shall be equal to or greater than the burst strength of the equivalent Schedule 80 CPVC pipe. Fittings shall be made of CPVC 23447-B, or better.

6. All CPVC piping and components shall be rated for potable water use.

2.02 DIELECTRIC UNIONS AND FLANGES

- A. Watts Regulator Company, Lochinvar, Wilkins or EPCO Sales, Inc., dielectric unions 2 inches and smaller; dielectric flanges 2 inches and larger; with iron female pipe thread to copper solder joint or brass female pipe thread end connections, non-asbestos gaskets, having a pressure rating of not less than 175 psig at 180°F.

2.03 UNIONS AND FLANGES

- A. Unions, flanges and gasket materials to have a pressure rating of not less than 150 psig at 180°F. Gasket material for flanges and flanged fittings shall be Teflon type. Treated paper gaskets are not acceptable.
- B. Two and One Half-Inch and Smaller Copper: ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.

PART 3—EXECUTION

3.01 GENERAL

- A. Install pipe and fittings in accordance with reference standards, manufacturers' recommendations, and recognized industry practices.

3.02 PREPARATION

- A. Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

3.03 ERECTION

- A. Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of plumbing piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
- B. Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.
- C. Maintain piping in clean condition internally during construction.
- D. Provide clearance for installation of insulation, access to valves, and piping specialties.
- E. Provide anchors, expansion joints, swing joints, and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

- F. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.

3.04 THREADED PIPE JOINTS

- A. Use a thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking shall be allowed.

3.05 DOMESTIC WATER

- A. Maintain piping system in clean condition during installation. Remove dirt and debris from assembly of piping as work progresses. Cap open pipe ends where left unattended or subject to contamination.
- B. Provide thrust restraints for 3-inch and larger exterior water piping joints, hydrants, caps, plugs, fittings, and bends of 22 1/2 degrees or more. Field apply continuous anti-corrosion coating to rodded restraint components. Protect mechanical joints, nuts and bolts from concrete cover. Cover with 8 mil sheet or tube polyethylene material sleeve.
- C. Install interior water piping with drain valves where indicated and at low points of system to allow complete drainage. Install shutoff valves where indicated and at the base of risers to allow isolation of portions of system for repair. Do not install water piping within exterior walls.

3.06 DIELECTRIC UNIONS AND FLANGES

- A. Install dielectric unions or flanges at each point where a copper-to-steel pipe connection is required in domestic water systems.

3.07 UNIONS AND FLANGES

- A. Install a union or flange at each connection to each piece of equipment and at other items which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.

3.08 TESTING AND CLEANING

- A. General:
 - 1. All new piping shall be tested. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.
 - 2. All piping shall be flushed or blown out after installation and prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests, flushing, sterilization. CONTRACTOR shall also provide all temporary sectionalizing devices and vents as required.
 - 3. All new and parts of existing altered, extended, or repaired plumbing system piping shall be tested for leaks and defects. Piping being tested shall not leak nor show any loss in test pressure for duration specified.

4. In cases of minor installation and repairs where specified water and/or air test procedures are deemed impractical, CONTRACTOR shall perform alternate testing procedures if acceptable to ENGINEER. Alternate testing procedures for minor installation and repairs may include visual evaluation of installed components by ENGINEER during a simulation of use.
5. The water used for tests shall be obtained from a potable source of supply.
6. Prepare testing reports. If testing is performed in segments, submit separate report for each segment, complete with diagram or clear description of applicable portion of piping. After testing has been accepted for portions thereof, certify in writing the time, date, name, and title of the persons reviewing the test. This shall also include the description of what portion of the system has been accepted. A complete record shall be maintained of all testing that has been accepted and shall be made available at the jobsite. Upon completion of the work, all records and certifications regarding testing shall be submitted to ENGINEER before final payment is made.
7. Verify systems are complete, flushed, and clean prior to testing. Isolate or remove components subject to damage or not rated for test pressure. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. Leave piping uninsulated, uncovered, and unconcealed until it has been tested. Where any portion of piping system must be concealed before completion of entire system, the portion shall be tested separately as specified for the entire system prior to concealment. CONTRACTOR shall expose all untested covered or concealed piping.
8. Gauges used for testing shall have increments as follows:
 - a. Tests requiring a pressure of 10 psi or less shall use a testing gauge having increments of 0.10 psi or less.
 - b. Tests requiring a pressure of greater than 10 psi but less than or equal to 100 psi shall use a testing gauge having increments of 1 psi or less.
 - c. Tests requiring a pressure of greater than 100 psi shall use a testing gauge having increments of 2 psi or less.
9. Separately test above- and belowground piping.
10. Do not introduce test water into piping systems when exposure to freezing temperatures is possible.
11. Do not introduce test water into sections of piping located above existing sensitive areas and/or equipment that may be damaged or contaminated by water leakage. Coordinate with OWNER to determine areas and/or equipment considered as being sensitive.
12. Defective work or material shall be reworked and replaced and test repeated. Repairs shall be made with new materials. Pipe dope, caulking, tape, dresser couplings, etc., shall not be used to correct deficiencies.
13. CONTRACTOR shall be responsible for cleaning up any leakage during flushing, testing, repairing, and disinfecting to the original condition any building parts subjected to spills or leakage.
14. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Backfill underground pressure mains prior to testing with the exception of thrust restrained valves that may be exposed to isolate potential leaks.
15. For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.
16. For air or nitrogen tests, gradually increase the pressure to not more than one-half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. System will not be accepted until it can be demonstrated that there is no measurable loss of test pressure during the test period.

B. Domestic Water System:

1. Subject piping system to a hydrostatic pressure of at least 100 pounds per-square-inch gauge, but not less than the operating pressure under which it is to be used. During test period, all pipe, fittings and accessories in the particular piping system that is being tested shall be carefully observed. If leaks are detected, such leaks shall be stopped and the hydrostatic test shall again be applied. This procedure shall be repeated until no leaks are detected. EXCEPTION: Piping located above sensitive areas and/or equipment that may be damaged or become contaminated due to test water leakage shall be tested with oil-free air in lieu of water.
2. After completion of the testing, all new and/or altered water piping systems shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. Do not exceed 150 parts per million at any time. Introduce chlorine into the supply stream at a rate sufficient to provide a uniform concentration throughout the system. All outlets shall be opened and closed several times. When the specified level of chlorine is detected at every outlet in the system, close all valves to prevent release of water from the system for 24 hours. At the completion of the 24-hour disinfection period, test every outlet for a minimum chlorine residual of 50 parts per million. This minimum residual must be present to proceed with flushing. Flush the system with clean water at a sufficient velocity until the residual chlorine detected at every outlet is within 0.2 parts per million or the normal water supply's level.
3. Sufficient samples must be taken no sooner than 24 hours after sterilization and flushing to represent the extent and complexity of the affected water system, along with a control sample to indicate municipal water quality at the time of testing. Send water samples to an accredited and/or certified laboratory to perform qualitative and quantitative bacteriological analysis in accordance with AWWA C651 or in accordance with Plumbing Code. CONTRACTOR shall obtain written certification from the independent testing agency stating that the water samples meet federal and state guidelines for safe drinking water. Failure to fully comply with the above procedures will result in a requirement to repeat the procedure until acceptable results are achieved, at no additional cost to OWNER.
4. Isolate or bypass equipment that would be detrimentally affected by disinfecting solution. Isolate all other sections of the domestic water system not being disinfected to prevent migration of chlorine.
5. Prior to injection of chlorine into the piping system, strategically place signs stating "Heavily Chlorinated Water-Do Not Drink," and protect all outlets to prevent use during disinfection and flushing procedures.
6. A bacteria test may not be necessary for small scale work. However, disinfection is required. Examples of small scale work are less than 20 feet of pipe, replacement and/or installation of a sink, drinking fountain, eyewash, backflow preventer, isolation valve, etc. Disinfect individual parts, fixtures, isolation valves, pipes, etc. by swabbing with full strength bleach (5.25%) or soaking for at least 30 minutes in a 500-ppm chlorine solution. Materials should then be thoroughly rinsed before putting into service.

System	Test Medium	Pressure	Final Test Duration
Aboveground Domestic or Nonpotable Water	Water	100 psig	8 hours

END OF SECTION

SECTION 22 11 23
DOMESTIC WATER PUMPS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Domestic Water Pumps.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within this specification.

1.03 QUALITY ASSURANCE

- A. Field inspection and testing to be performed under provisions of Section 01 45 00—Quality Control.
- B. Inspect completed installation for physical damage.
- C. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as noted on the drawings.
- D. Electrical components shall be UL listed for the service specified.
- E. Electrical components and work shall be in accordance with the National Electrical Code.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations and sections.
- C. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.
- D. Submittal shall include pump-specific performance curves showing flow, head and motor horsepower.

- E. Submit manufacturer's installation instructions and recommendations.
- F. Submittals must be specific to this project. Generic submittals will not be accepted.
- G. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.
- H. Provide detailed control wiring diagrams as well as all external connections.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements shall be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.
- F. Motors, shafts and bearings shall be protected from weather and dust.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 IN-LINE CENTRIFUGAL PUMPS (TMWP-15-01)

- A. Acceptable manufacturers are Bell and Gossett, Gould, Grundfos, Taco.
- B. Type: Horizontal, single stage, oil lubricated in-line pumps, 150 psig maximum working pressure at operating temperature of 230°F continuous. The manufacturer shall certify all pump ratings. All pumps shall operate without excessive noise or vibration.
- C. All products in contact with potable water shall be NSF 61/NSF 372 certified. Documentation of compliance shall be provided in the shop drawing.
- D. Casing: Bronze, lead-free flanged suction and discharge connection.
- E. Impeller: Brass or bronze, keyed to the shaft, single suction enclosed type, hydraulically and dynamically balanced.
- F. Bearings shall be lubricated by circulating fluid.
- G. Shaft shall be stainless steel or carbon steel with stainless steel or bronze sleeve, integral thrust collar.
- H. Seal shall be mechanical type, carbon rotating against a stationary ceramic seat, 230°F maximum continuous operating temperature.
- I. Drive shall be by flexible coupling.
- J. Pump control shall be by ITT Bell & Gossett TC-1 automatic timer kit, or equal. The timer shall be suitable for 115/120 VAC, 60 Hz operation and mounting on the connection box of pump. If the pump is not accessible, CONTRACTOR shall mount timer in a convenient location determined by OWNER. The timer shall provide both automatic and manual on-off.
- K. Motor: Provide pump with open drip-proof motor with built-in thermal overload protection sized for non-overloading operation over the entire pump curve. Furnish each pump and motor with a nameplate giving the manufacturer's name, serial number of pump, capacity in GPM and head in feet at design condition, horsepower, voltage, frequency, speed and full load current.

2.02 IN-LINE WET ROTOR CIRCULATOR PUMPS (DHWP-15-01, DHWP-20-01)

- A. Acceptable manufactures are Bell and Gossett, Grundfos, or Taco.

- B. Type: Horizontal or vertical, variable speed, wet rotor, inline pumps, 145 psig maximum working pressure at operating temperature of 230°F continuous. The manufacturer shall certify all pump ratings. All pumps shall operate without excessive noise or vibration.
- C. The pump internals shall be capable of being serviced without removing piping connections.
- D. Pump volute shall be constructed of Type 304 stainless steel. Pump body shall be constructed of Type 304 stainless steel.
- E. Motor shall be synchronous, permanent-magnet motor. Conventional induction motors will not be accepted.
- F. Motor shall be driven by an integral variable frequency drive provided by the manufacturer. Pump, motor, and VFD shall be factory tested as one complete unit by the pump manufacturer prior to shipment.
- G. Motor shall be UL listed to protect the pump against over/under voltage, motor and electronics over-temperature, over-current, locked rotor, and no-load condition (dry run).
- H. Pumps shall be UL 778 listed and bear the UL listing mark.
- I. Provide temperature and pressure gauges as shown on the Drawings.
- J. Controls:
 - 1. Pump shall have standard analog (0-10V and 4-20mA) input connections built into the VFD.
 - 2. Pump shall have the following standard modes of operation: constant speed, constant pressure, proportional pressure, and night mode.
 - 3. Pump shall have the following temperature dependent operating modes: Setpoint temperature and differential temperature.
 - 4. Pump DHWP-15-01 and DHWP-20-01 shall be placed in temperature-dependent operating mode by the plumbing contractor during installation.
 - 5. Pump shall be provided with temperature sensor 104502 for ecocirc 20-18 or equal device compatible with pump temperature-dependent operating modes. Device shall be wired back to pump. Wiring and conduit shall be by Division 26.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment where indicated in accordance with manufacturer's recommendations. Coordinate equipment location with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. Locate equipment and arrange plumbing piping to provide access space for servicing all components.
- B. Set pumps on concrete housekeeping pads where indicated on the Drawings. Adjust and level equipment.
- C. Connect equipment to water piping using unions or flanges and isolation valves. Pump shall be supported separately from piping.

- D. Startup and test equipment adjusting operating and safety controls for proper operation.
- E. Lubricate pumps before startup. Adjust pumps for rated flow. Clean and blowdown strainers after 8 hours of operation.
- F. Installation and operation requirements for inline wet rotor variable speed circulator pumps shall comply with the following:
 - 1. CONTRACTOR shall refer to the manufacturer's installation and operation manual to check that the orientation of the pump motor complies with the manufacturer's requirements.
 - 2. CONTRACTOR shall provide line size shut-off valve on the suction and discharge sides of the pump.
 - 3. Pumps shall not be run dry to check rotation.
 - 4. Installation shall comply with all other manufacturer recommendations.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: All plumbing pipe and pipe fittings for this project within and up to 5 feet from the building foundation wall.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work under this section.

1.02 QUALITY ASSURANCE

- A. Quality assurance shall be in accordance with Section 01 45 00—Quality Control.
- B. Order all copper, cast iron, steel, PVC, and polyethylene pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.
- C. Any installed material not meeting the specification shall be replaced with material that meets these specifications without additional cost to OWNER.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. CONTRACTOR shall provide schedule indicating the ASTM or CISPI specification number of the pipe being proposed along with its type and grade if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.
- C. CONTRACTOR shall provide statement from manufacturer on manufacturer's letterhead that pipe furnished meets the ASTM or CISPI specification contained in this section.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Promptly inspect shipments to review that the material is undamaged and complies with specifications.
- B. Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, aboveground packaging.
- C. Offsite storage agreements will not relieve CONTRACTOR from using proper storage techniques.

- D. Storage and protection methods must allow observation to verify products.

1.05 DESIGN CRITERIA

- A. Use only new material, free of defects, rust, and scale, and meeting the latest revision of ASTM or CISPI specifications as listed in this specification.
- B. Construct all piping for the highest pressures and temperatures in the respective system.
- C. Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in ventilation plenum spaces, including plenum ceilings.
- D. Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 SANITARY WASTE AND VENT

- A. Aboveground PVC shall not be used where smoke generation, noise transmission, or physical abuse/durability are an issue.
- B. Interior Above Ground, Gravity: PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.
- C. Interior Below Ground, Gravity: PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

PART 3-EXECUTION

3.01 GENERAL

- A. Install pipe and fittings in accordance with reference standards, manufacturers recommendations and recognized industry practices.

3.02 PREPARATION

- A. Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

3.03 ERECTION

- A. Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of plumbing piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
- B. Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.
- C. Maintain piping in clean condition internally during construction.
- D. Provide clearance for installation of insulation, access to valves and piping specialties.
- E. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.
- F. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.
- G. Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Provide access to valves and specialties for maintenance. Make connections to all equipment, fixtures and systems installed by others where same requires the piping services indicated in this section.

3.04 COPPER PIPE JOINTS

- A. Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with metal brush, emery cloth or sandpaper. Remove residue from the cleaning operation, apply flux and assemble joint to socket stop. Apply flame to fitting until solder melts when placed at joint. Remove flame and feed solder into joint until full penetration of cup and ring of solder appears. Wipe excess solder and flux from joint.

3.05 WELDED PIPE JOINTS

- A. Make all welded joints by fusion welding in accordance with ASME Codes, ANSI B31, and State Codes where applicable. "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half the diameter of the main.

3.06 THREADED PIPE JOINTS

- A. Use a thread lubricant or teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.07 SOLVENT WELDED PIPE JOINTS

- A. Install in accordance with ASTM D2855 "Making Solvent Cemented Joints With PVC Pipe and Fittings". Saw cut piping square and smooth. Tube cutters may be used if they are fitted with wheels designed for use with PVC/CPVC pipe that do not leave a raised bead on pipe exterior. Support and restrain pipe during cutting to prevent nicks and scratches. Bevel ends 10-15 degrees and deburr interior. Remove dust, drips, moisture, grease and other superfluous materials from pipe interior and exterior. Check dry fit of pipe and fittings. Reject materials which are out of round or do not fit within close tolerance. Use heavy body solvent cement for large diameter fittings.
- B. Maintain pipe, fittings, primer, and cement between 40 and 100 degrees during application and curing. Apply primer and solvent using separate daubers (3-inch and smaller piping only) or clean natural bristle brushes about half the size of the pipe diameter. Apply primer to the fitting socket and pipe surface with a scrubbing motion. Check for penetration and reapply as needed to dissolve surface to a depth of 4 to 5 thousandths. Apply solvent cement to the fitting socket and pipe in an amount greater than needed to fill any gap. While both surfaces are wet, insert pipe into socket fitting with a quarter turn to the bottom of the socket. Solvent cement application and insertion must be completed in less than 1 minute. Minimum of 2 installers is required on piping 4 inches and larger. Hold joint for 30 seconds or until set. Reference manufacturer recommendations for initial set time before handling and for full curing time before pressure testing. Cold weather solvent/cement may be utilized only under unusual circumstances and when specifically approved by ENGINEER.

3.08 SANITARY WASTE AND VENT

- A. Verify invert elevations and building elevations prior to installation. Install exterior piping pitched to drain at indicated elevations and slope. Install interior piping pitched to drain at minimum slope of 1/4-inch per foot where possible and in no case less than 1/8-inch per foot for piping 3 inches and larger.
- B. Flush piping inlets (floor drains, hub drains, mop basins, fixtures, etc.) with high flow of water at completion of project to demonstrate full flow capacity. Remove blockages and make necessary repairs where flow is found to be impeded.

3.09 PIPING SYSTEM LEAK TESTS

- A. Drainage and Vent System:
 - 1. Subject gravity drainage and vent piping and joints to a test pressure and duration as outlined in the schedule at the end of this section. If, at end of indicated test duration, the level of the water has been lowered by leakage, the leaks must be found and

stopped and the water level shall again be raised to the level described and the test repeated until, after another test duration period, there shall be no perceptible lowering of the water level in the system being tested.

2. Piping located above sensitive areas and/or equipment that may be damaged or become contaminated because of test water leakage shall be tested with air. Air test may also be performed when allowed by ENGINEER. Isolate the test section from all other sections and slowly fill pipe with oil-free air until there is a uniform gauge pressure of 5 pounds per square inch. The air pressure shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig. This pressure shall be held for a test period of at least 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test period.
 3. Should the completion of these tests leave any reasonable question of a doubt relative to the integrity of the installation, additional tests or measures shall be performed to demonstrate the reliability of these systems to ENGINEER.
 4. Test plugs must extend outside the end of pipe to provide a visible indication for removal after the test has been completed.
 5. Each floor drain P-trap that has successfully passed pressure testing shall be proven clean and free of debris as follows:
 - a. A request shall be submitted to OWNER, identifying the quantity and location of drain(s) to be observed.
 - b. Vacuum out each floor drain P-trap. An observation of the trap shall be performed to verify that the trap is debris free.
 - c. Perform a free-flowing test by pouring two 5-gallon buckets of water down the floor drain.
 - d. After confirming that the floor drain trap is clean and free of debris, review that the trap is filled with water.
 - e. At the discretion of ENGINEER, an observation of the trap using a sewer scope may be required in addition to, or in lieu of, a vacuum procedure.
 6. OWNER may require that any portion of the drainage, waste, and vent systems installed be proven undamaged, clean and free of debris. Verification of the interior condition of piping shall be accomplished using a sewer scope or other method as acceptable to ENGINEER.
- B. Isolate or remove components from system which are not rated for test pressure. Test piping in sections or entire system as required by sequence of construction. Do not insulate or conceal pipe until it has been successfully tested.
- C. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints.
- D. For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.
- E. Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test; caulking will not be acceptable.

- F. Entire test shall be witnessed by OWNER or ENGINEER.

System	Test Medium	Final Test	
		Pressure	Duration
Sanitary Waste and Vent	Water	10 feet water	2 hours

END OF SECTION

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: This section includes specifications for floor drains, cleanouts, hub drains, and other miscellaneous plumbing specialties.
- B. Related Sections and Divisions: Applicable provisions of Division 01 govern work under this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New start-up shall be for the purpose of determining alignment, lubrication, voltage, and amperage readings. New start-up shall confirm all proper electrical connections and discharge and suction gauge readings. A copy of the start-up report shall be made and sent to both CONTRACTOR and to ENGINEER.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.
- C. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.
- D. Submit manufacturer's installation instructions.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.
- B. Include replacement and spare parts lists.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 FLOOR DRAINS

- A. All floor drains shall be furnished and installed with all options and accessories required for a leak-free installation within the particular construction in which they are to be mounted.
- B. FD-1: Floor drains in finished areas or tiled areas, where shown on the Drawings, shall be Zurn ZN-415, Type H, or Wade Model 1300-1-11, or Josam 32100-HP-7-2, with 6-inch round adjustable strainer top with integral clamping frame and secured heelproof grate. Provide polished nickel bronze top. Provide square grate for tiled floors.
- C. FD-2: Floor drains in unfinished areas for piping 4 inches and under shall be Zurn ZN-550, Wade 1100-AX, or Josam 30900-9AD, and for piping larger than 4 inches Zurn ZN-505, Wade W-1240-1, or Josam 32200-1. Provide nickel bronze grate.
- D. FD-3: Stainless Steel Floor Drains: Floor drains in areas where noted on Drawings shall be Kusel, KE-100, Jay R. Smith 9635-SRF, or AWI Manufacturing. Floor drain shall be 316 stainless steel with perforated-style basket strainer. Provide minimum 4-inch, no hub, Schedule 40 outlet, and standard industrial finish polished plate and solid cover.
- E. Each drain shall be provided with a trap. A minimum of one cleanout shall be provided for each single or common leader.

2.02 TRAP GUARDS

- A. Include trap guards on all new floor drains and hub drains.
- B. Manufacturer: ProSet Systems Trap Guard, Jay R. Smith Quad Close, Sure Seal, or approved equal.
- C. Flexible elastomeric PVC construction diaphragm trap guard for installation in new floor drains and hub drains. Trap guard to prevent trap evaporation and waste backflow. Size as applicable to the drain outlet size, up to 4-inch size.

2.03 HUB DRAINS

- A. HD-1: Provide Kusel Equipment, AWI Manufacturing, or Jay R. Smith 316 stainless steel hub drain. Drain shall consist of fully welded components. Portions of drain visible in final installation shall be blasted clean to remove discoloration and provide a uniform finished appearance. All pipe shall be sourced from the United States. Pipe thickness shall be Schedule 40.

2.04 CLEANOUTS

- A. Manufacturers shall be Zurn, Wade, Jay R. Smith, Josam, or Kusel.
- B. Each cleanout shall be gas- and watertight.
- C. Interior concrete floor areas: Enameled cast iron body with round or square adjustable scoriated polished nickel bronze cover, tapered threaded ABS closure plug. Zurn ZN-1400.

- D. Interior Floor Areas: All Type 304 stainless steel cleanout body and plug with O-ring seal. Provide NSF certification with a load classification of Extra Heavy Duty based on ASME A112.36.2M with a load rating of between 7,500 and 10,000 lbs. ZURN Z1745, Kusel KEC Series, or equal.

2.05 VENT FLASHINGS

- A. Manufacturers: Semco, Oatey.
- B. Formed 3 lb./sq. ft. lead flashing with minimum base size of 15 inches by 17 inches.
- C. Single Ply Membrane Roofs: Flashing boot of material compatible with roofing membrane with base flange for adhering to membrane and stainless steel drawband for securing to vent pipe.

2.06 VENT SCREENS

- A. Manufacturers: Raven Products, or equal.
- B. PVC termination vent with stainless steel screen. Pipe material shall be Schedule 40 PVC with Type 304 stainless steel screen. Model number shall be based on vent through roof pipe size.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Coordinate location and setting of plumbing specialties with adjacent construction. Install in accordance with manufacturers recommendations.
- B. Set floor drains and cleanouts level and plumb adjusted to finished floor elevation, roof elevation or finished wall location. Locate where serviceable. Allow a minimum 18-inch clearance around cleanouts for rodding. Lubricate threaded cleanout plugs with graphite and oil, teflon tape, or waterproof grease. Install trap primer connections where indicated.
- C. Trap guards shall be provided as indicated on the Drawings.
- D. Flash vent penetrations through roof. Turn down top of lead flashing into vent pipe. Tighten drawband of membrane boot to vent pipe. Adhere base flashing to deck or membrane. Provide waterproof patch around penetration on existing roofs.

END OF SECTION

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1—GENERAL

1.01 SCOPE

- A. This section includes specifications for water heaters and other equipment used for plumbing applications.
- B. Related Sections and Division: Applicable provisions of Division 01 shall govern work under this section.

1.02 QUALITY ASSURANCE

- A. Field inspection and testing to be performed under provisions of Section 01 45 00—Quality Control.
- B. Inspect completed installation for physical damage.

1.03 SHOP DRAWINGS

- A. Submit under provisions of Section 01 33 00—Submittals. Included in submittals shall be detailed control wiring diagrams that show logic circuits for the unit, as well as all external connections.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA.
- C. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 WATER HEATERS

- A. Power Vented Gas Fired Water Heater (DWH-15-01 and DWH-20-01):
 - 1. Manufacturers: A.O. Smith, Bradford White, and Lochinvar.
 - 2. Type: Power-vented natural gas fired atmospheric storage water heater. Design to be AGA-certified with 1-year commercial tank and parts warranty.
 - 3. Water heater performance shall be as listed on Drawings.
 - 4. Tank: Steel, glass-lined tank rated for 150 psig complete with removable magnesium anode rod, plastic diffuser type dip tube, inlet and outlet heat trap fittings, polyurethane foam insulation, painted steel jacket, drain valve and temperature and pressure relief valve.
 - 5. Burner: Construct burner of cast iron, aluminized steel (natural gas only) or stainless steel.
 - 6. Controls: 120-volt, single-phase, 60 Hz controls consisting of operating thermostat with adjustable temperature control, energy cutoff, gas valve, integral pressure regulator, intermittent spark ignition, blower pressure switches, blower interlock and 6-foot power cord and plug.
 - 7. Vent: Schedule 40 PVC with DWV solvent weld fittings with weatherproof screened outlet tee or elbow as recommended by manufacturer.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment where indicated in accordance with manufacturer's recommendations. Coordinate equipment location with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. Locate equipment and arrange plumbing piping to provide access space for servicing all components.
- B. Set commercial water heaters and storage tanks on concrete housekeeping pads. Adjust and level equipment.
- C. Connect equipment to water and drain piping using unions or flanges and isolation valves.
- D. Size temperature and relief valves per CSA ratings. Pipe temperature and pressure relief valves to floor drain or floor as indicated.
- E. Startup and test equipment adjusting operating and safety controls for proper operation.
- F. Provide isolation valves at plumbing equipment.

END OF SECTION

SECTION 22 42 00

COMMERCIAL PLUMBING FIXTURES

PART 1—GENERAL

1.01 SCOPE

- A. This section includes specifications for plumbing fixtures, faucets, and trim.

1.02 REFERENCE

- A. Applicable provisions of Division 01 shall govern work under this section.

1.03 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Section GC—General Conditions of the Contract, Equals and Substitutions.
- B. Plumbing products must be approved or have pending approval at the time of shop drawing submission.

1.04 SHOP DRAWINGS

- A. Include data concerning sizes, utility sizes, rough in-dimensions, capacities, materials of construction, ratings, weights, trim, finishes, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1.05 ENERGY EFFICIENCY REQUIREMENTS

- A. Plumbing fixtures must meet the following maximum water usage requirements which are based upon Federal Energy Management Program (FEMP) performance requirements.
 - 1. Lavatory Faucets: Flow of 2 gpm or less and .25 gallon per cycle or less (based on inlet pressure of 60 psi.)
 - 2. Showerheads: Flow of 2.2 gpm or less (based on inlet pressure of 80 psi).
 - 3. Urinal Flush Valves: 1.0 gallon per flush or less.
 - 4. Water Closet Flush Valves: 1.6 gallons per flush or less.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material,

an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 PLUMBING FIXTURES

- A. Manufacturers: Fixture descriptions establish fixture type, quality, materials, features, and size. Products of the following manufacturers determined to be equal by ENGINEER will be accepted.
 - 1. Water Closets: American Standard, Kohler, Zurn.
 - 2. Water Closet Seats: Bemis, Beneke, Centoco, Olsonite Sperzel.
 - 3. Lavatories: American Standard, Kohler, Zurn.
 - 4. Faucets: Chicago Faucet, Kohler, or Zurn.
 - 5. Service Sinks: American Standard, Crane, Kohler.
 - 6. Emergency Eyewash Fountains and Showers: Bradley, Guardian, or Haws.
- B. Water Closets (WC-1): Floor mount bottom outlet white vitreous china siphon jet close-coupled tank water closet with elongated bowl, 2 1/8-inch passageway, 14 1/2-inch rim height, insulating tank liner, and 1.6-gallon flush.
 - 1. Fixture: Kohler Wellcome Ultra K-96053.
 - 2. Flush Valve: Sloan Royal 116-1.5-YK.
 - 3. Seat: Bemis 1655-SS/C white solid plastic open front seat.
- C. Lavatories (L-1): K-2030 (20-inch by 18-inch), A 0356.015, wall-hung with pop-up drain, supplies, and cast iron hanger. Provide ADA-approved faucets. Provide Sloan Model No. ETF-80, or equal, electronic hand washing faucet with 120 VAC/24 VAC transformer, vandal-resistant spray head, and trim plate.
- D. Faucet (L-2) only: Provide Chicago Faucet 1100-HA8ABCP, or equal, with 2.2 gpm aerator, deck mounted 8" fixed centers hot and cold water sink faucet, and 2-inch vandal-proof canopy single wing.
- E. Service Sinks (SS-1): K 6719 (24-inch by 20-inch), A 7692.023, with Chicago Faucets 835-SFB for supplies from below exposed on wall as in pump stations. Chicago Faucets 835-RCF for supplies from above and exposed. Chicago Faucets 782 VBCP for behind wall supplies fittings, wall brace, and wall hangers. Faucet shall include cross-connection prevention device.
- F. Emergency Showers:
 - 1. Manufacturers: Bradley (B), Guardian (G), Haws (H), or equal.
 - 2. Unit shall be hydrostatically tested to meet or exceed ANSI Z358.
 - 3. All units shall be identified with a high-visibility sign made from rigid polyethylene, Brady B-450, V-style 45-degree, 12-inch by 18-inch Brady 49043/49044, or equal. Provide one sign at each unit.
 - 4. Emergency Eyewash Station (EEWS-1): Safety station with ABS plastic shower head, ABS plastic bowl, powder-coated cast aluminum flag handle and floor flange, 1 1/4-inch IPS Schedule 40 galvanized pipe and fittings, 1-inch IPS and 1/2-inch IPS U.S.-made chrome-plated brass stay-open ball valve, and polished stainless steel pull rod. Unit shall have polypropylene "GS" spray heads with integral "flip-top" dust covers, strainer,

and 1.8 gpm flow control orifice mounted on chrome-plated brass head assembly, Model No. (B) S19-314, (G) G1902, or (H) 8320.

5. EEWS-2: Wall-mounted, frost-proof, drench shower and eyewash unit. Provide galvanized steel unit with safety yellow coating, chrome plated with brass spray head assembly with protective covers. Unit shall have 1-inch NPT stay open valve and 1 1/4-inch water supply connection, Model (B) S19-310TW, or equal. CONTRACTOR to coordinate installation wall thickness for each unit prior to ordering.
6. Thermoplastic Mixing Valve (TMV-1): Thermostatic mixing valve with temperature override protection set for 85°F valve for emergency shower. Unit shall include built-in cold water bypass, thermostatic control valve, rough brass finish, solid bimetal thermostat, limit stop factory set for 90°F, integral check stops, dial thermometer, and recessed stainless steel cabinet with door and lock. Unit shall be ASSE 1071 rated. Performance: Unit shall have a flow range of 0.5 gpm to 50 gpm with a maximum pressure loss of 30 psi, Model No. (G) G6040, or equal.
7. TMV-2: Thermostatic mixing valve for emergency shower. Unit shall include recirculated water connection, built-in cold water bypass, thermostatic control valve, rough brass finish, strainer check stops on inlets, limit stop factory set for 90°F, dial thermometer, and surface-mounted stainless steel cabinet. Unit shall be ASSE 1071 rated. Performance: Unit shall have a flow range of 3 gpm to 84 gpm with a maximum pressure loss of 60 psi, Model No. (B) S19-2250 (EFX50).

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install plumbing fixtures in accordance with manufacturer's instructions. Set level and plumb. Secure in place to counters, floors and walls providing solid bearing and secure mounting. Bolt fixture carriers to floor and wall. Secure rough-in fixture piping to prevent movement of exposed piping.
- B. Install each fixture with trap easily removable for servicing and cleaning. Install fixture stops in readily accessible location for servicing.
- C. Install barrier free fixtures in compliance with IBC 1108 and 3408, COMM 52, 69 and Federal ADA Accessibility Guidelines. Install barrier free lavatory traps parallel and adjacent to wall and supplies and stops elevated to 27 inches above floor to avoid contact by wheelchair users.
- D. Each fixture shall have a stop valve installation to control the fixture. Stop valves shall be heavy duty type with brass stems and screwed or sweat inlet connections. Compression type inlets are not acceptable.
- E. Cover pipe penetrations with escutcheons. Exposed traps, stops, piping and escutcheons to be chrome plated brass, same items in concealed locations may be of rough brass finish.
- F. Seal openings between walls, floors and fixtures with mildew-resistant silicone sealant same color as fixture.
- G. Test fixtures to demonstrate proper operation. Replace malfunctioning units or components. Adjust valves for intended water flow rate to fixtures without splashing, noise or overflow. Adjust self-closing lavatory faucets to 15 second cycle. Adjust shower valve temperature limit stops to 110-degree maximum outlet temperature.

- H. Protect fixtures during construction. At completion clean plumbing fixtures and trim using manufacturer's recommended cleaning methods and materials.

END OF SECTION

SECTION 23 05 23

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Valve specifications for all Division 23 systems unless otherwise noted.
- B. Related Section and Divisions: Applicable provisions of Division 01 govern work under this section.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00—Submittals.
- B. CONTRACTOR shall submit a schedule of all valves indicating type of service, dimensions, materials of construction, and pressure/temperature ratings for all valves to be used on the project. Temperature ratings specified are for continuous operation.

1.03 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under Section 01 33 00—Submittals.

1.04 DESIGN CRITERIA

- A. Where valves are specified for individual mechanical services (i.e., hot water heating, steam, etc.) all valves shall be of the same manufacturer.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 GENERAL

- A. Manufacturers: Acceptable manufacturers are Apollo, Bell & Gossett, Crane, Danfoss-Flomatic, DeZurik, Fisher, Grinnell, Jamesbury, Milwaukee, Nibco, Vogt, Watts.

2.02 NATURAL GAS SYSTEM

- A. Interior Shutoff Valves 2-Inch and Smaller: Ball valve, bronze body, threaded ends, chrome-plated bronze or stainless steel ball, full or conventional port, Teflon seat, blowout-proof stem, two-piece construction, suitable for 150 psig working pressure. U.L. listed for use as natural gas shut-off. Manufacturers Apollo 77G-UL, Nibco T-585-70-UL, Crane 9201.
- B. Exterior Aboveground Shutoff Valves: Black body, brass plug type with square head, top check and lock wing stop lock, threaded ends for 25 psi or less gas pressure requirements, McDonald No. 10687B, or equal.
- C. Pressure Regulators:
 - 1. Manufacturers: Rockwell, Maxitrol, Fischer, or equal.
 - 2. All pressure regulators shall be designed, manufactured and approved for natural gas service.
 - 3. Pressure regulators for individual service lines shall be capable of reducing distribution line pressure to pressures required for users. Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Regulator shall have a single port with orifice diameter no greater than that recommended by manufacturer for the maximum gas pressure at the regulator inlet. Regulator vent valve shall be of resilient materials designed to withstand flow conditions when pressed against valve port. Regulator shall be capable of limiting buildup of pressure under no-flow conditions to 50% or less of the discharge pressure maintained under flow conditions. Provide commercial-grade diaphragm type with internal relief valve, vent valve, cast iron body, and Buna-N diaphragm.
 - 4. Appliance regulators may be provided with a vent limiting device, where entire regulator and vent limiter complies with ANSI Z21.80 as an assembly and is installed in accordance with manufacturer's recommendations and NFPA 54.

PART 3-EXECUTION

3.01 GENERAL

- A. Properly align piping before installation of valves in an upright position; operators installed below the valves will not be accepted.
- B. Install valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.
- C. Install all valves with the stem in the upright position. Valves may be installed with the stem in the horizontal position only where space limitations do not allow installation in an upright position or where large valves are provided with chain wheel operators. Where valves 2 1/2-inch and larger are located more than 12-foot 0-inch above mechanical room floors,

install valve with stem in the horizontal position and provide a chain wheel operator. Valves installed with the stems down, will not be accepted.

- D. Install stem extensions when shipped loose from valve.
- E. Prior to flushing of piping systems, place all valves in the full-open position.
- F. Install all valves, and piping specialties, including items furnished by others, as specified and/or detailed. Make connections to all equipment installed by others where that equipment requires the piping services indicated in this section.
- G. Install valves for shutoff and to isolate equipment, parts of systems, or vertical risers. All valves shall be located such that servicing and operation is possible with adequate clearance for access. Install line shutoff valve at each branch connection to riser. Branch line shutoff valves shall be automatic type where shown on Drawings. Install valves with stems upright or horizontal, not inverted unless required otherwise by the valve manufacturer.
- H. Valves, regulators, flanges, unions, and similar appurtenances shall be accessible for operation and servicing and shall not be located within chases, above ceilings, within walls/partitions, or nonaccessible locations.
- I. Identify all gas regulators, including utility-provided regulators, in accordance with Section 20 05 53—Identification for Fire Suppression, Plumbing, and HVAC Piping and Equipment.
- J. Locate all valves so that the removal of their bonnets is possible. All flanged valves in horizontal lines with the valve stem in a horizontal position shall be positioned so that the valve stem is inclined one bolt hole above the horizontal position. Screw pattern valves placed in horizontal lines shall be installed with their valve stems at a minimum 30-degree angle above the horizontal position. All valves must be true and straight at the time the system is tested and inspected for final acceptance. Install valves as close as possible to the locations indicated on the Drawings. Any change in valve location must be so indicated on the Record Drawings.
- K. Shut-Off Valves: Install shut-off valves at all equipment, at each branch take-off from mains, and at each automatic valve for isolation or repair.
- L. Gas Pressure Regulators: When the gas pressure regulator is equipped with a vent connection, run a connection size vent to outside air in accordance with codes. Use a larger size vent when required by the manufacturer's installation instructions.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1—GENERAL

1.01 SCOPE

- A. This section includes specifications for supports of all HVAC piping and equipment and materials as well as piping system anchors.

1.02 RELATED WORK

- A. Section 23 07 13—Ductwork Insulation for Heating, Ventilation, and Air Conditioning.

1.03 REFERENCE

- A. Applicable provisions of Division 01 shall govern work under this section.

1.04 REFERENCE STANDARDS

- A. MSS SP-58—Materials, Design, Manufacture, Selection, Application, and Installation

1.05 DESCRIPTION

- A. Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for pressure piping.
- B. Do not hang any mechanical item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.
- C. Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.
- D. Protect insulation at all hanger points; see Related Work above.

1.06 SHOP DRAWINGS

- A. Refer to Division 01, General Conditions, Submittals.
- B. Schedule of all hanger and support devices indicating shields, attachment methods, and type of device for each pipe size and type of service.

1.07 DESIGN CRITERIA

- A. Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58, unless noted otherwise.

- B. Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.
- C. Allow sufficient space between adjacent pipes and ducts for insulation, valve operation, routine maintenance, etc.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 PIPE HANGER AND SUPPORT MANUFACTURERS

- A. Acceptable manufacturers include Anvil, B-Line, G-Strut, Fee and Mason, Kindorf, Michigan Hanger, Unistrut, or approved equal. Anvil figure numbers are listed below; equivalent material by other manufacturers is acceptable.

2.02 STRUCTURAL SUPPORTS

- A. Provide all supporting steel required for the installation of mechanical equipment and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support tanks and equipment.

2.03 PIPE HANGERS AND SUPPORTS

- A. Hangers For Steel Pipe Sizes 1/2-Inch Through 2 Inches: Carbon steel, adjustable, clevis, black finish. Anvil figure 65 or 260.
- B. Hangers for Steel Pipe Sizes 2 1/2 Inches and Over: Carbon steel, adjustable, clevis, black finish. Anvil figure 260.
- C. Adjustable steel yoke, cast iron roll, double hanger. Anvil figure 181.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods, if calculations are submitted.

- E. Wall Support:
1. Welded steel bracket with hanger. B-Line B3068 Series, Anvil 194 Series.
 2. Perforated epoxy painted finish, 16-12 gauge min., steel channels securely anchored to wall structure with interlocking, split type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000 series clamps, Anvil type AS200 H with AS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Anvil cushion clamp assembly.
- F. Vertical Riser Support: Carbon steel riser clamp, copper plated when used with copper pipe. Anvil figure 261 for steel pipe, figure CT121 for copper pipe.
- G. Steel Hanger Rods:
1. Continuous threaded, black finish.
 2. Size rods for individual hangers and trapeze support as indicated in the following schedule.
 3. Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated.

Maximum Load (pounds)	Rod Diameter (inches)
(650°F Maximum Temperature)	
610	3/8
1,130	1/2
1,810	5/8
2,710	3/4
3,770	7/8
4,960	1
8,000	1 1/4

4. Provide rods complete with adjusting and lock nuts.

2.04 BEAM CLAMPS

- A. MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62-inch thick for single threaded rods of 3/8-, 1/2-, and 5/8-inch diameter, for use with pipe sizes 4-inch and less. Furnish with a hardened steel cup point set screw. Anvil figure 86.
- B. MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1 1/2-inch diameter but limited in application to pipe sizes 8-inch and less without prior approval. Anvil figure 228.

2.05 CONCRETE INSERTS

- A. Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

2.06 ANCHORS

- A. Use welding steel shapes, plates, and bars to secure piping to the structure.

2.07 CORROSIVE ATMOSPHERE COATINGS

- A. Corrosive environments shall be as noted on the Drawings.
- B. Factory coat supports and anchors used in corrosive atmospheres (including exterior locations) with hot dip galvanizing after fabrication, ASTM A123, 1.5 ounces/square foot of surface, each side. Mechanically galvanize threaded products, ASTM B695 Class 150, 2.0 mil coating. Field cuts and damaged finishes to be field covered with zinc rich paint of comparable thickness to factory coating.
- C. Pipe in chemical rooms shall be supported with a plastic support system, Aickinstrut, or equal.
- D. Type 316 stainless steel supports and fasteners shall be used in tanks, wet wells, screening and grit facilities, sludge dewatering or thickening facilities, or as indicated.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.
- B. Piping shall be supported independently from ductwork and all other trades.
- C. Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes for the supporting steel.
- D. Perform all welding in accordance with standards of the American Welding Society. Clean surfaces of loose scale, rust, paint or other foreign matter and properly align before welding. Use wire brush on welds after welding. Welds shall show uniform section, smoothness of weld metal and freedom from porosity and clinkers. Where necessary to achieve smooth connections, joints shall be dressed smooth.

3.02 HANGER AND SUPPORT SPACING

- A. Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.
- B. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers. Provide minimum of 3 inches between piping systems (flanges, insulation, valves, etc.)
- C. Support riser piping independently of connected horizontal piping.
- D. Adjust hangers to obtain the slope specified in the piping section of this specification.

E. Space hangers for pipe as follows:

Pipe Material	Pipe Size	Maximum Spacing
Thermoplastic	All sizes	6'-0"
Copper	1/2" through 1 1/4"	5'-0"
Copper	1 1/2" and larger	8'-0"

3.03 VERTICAL RISER CLAMPS

- A. Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor.

3.04 ANCHORS

- A. Install where indicated on the Drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs between expansion loops. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Balancing Air Systems.
 - 2. Thermal Performance Testing.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASHRAE 11—Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air Conditioning, and Refrigeration Systems.
 - 2. SMACNA—HVAC Systems Testing, Adjusting, and Balancing.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Prior to final balancing, submit a preliminary report that includes the following design information for all control modes. Design information shall be from approved shop drawings. Report shall compare design and field tested data.
 - 1. For each supply, return and exhaust register, and ceiling outlet:
 - a. Room number.
 - b. Type of register and outlet and catalog size.
 - c. Air flow factor.
 - d. Design CFM and velocity.
 - e. Actual CFM and velocity.
 - f. Percent of design CFM.
 - g. Room pressure relationship.
 - 2. For each fan:
 - a. Unit number.
 - b. Fan size and wheel type.
 - c. Motor horsepower.
 - d. Motor nameplate voltage and amps.
 - e. Design CFM and static pressure (total pressure).
 - f. Actual CFM and static pressure (total pressure).
 - g. Actual fan RPM.
 - h. Actual motor voltage and amps (each phase).

- C. Provide summary sheet describing mechanical system deficiencies. Where not physically observable, provide pressure and/or flow readings to demonstrate suspected deficiencies. Describe objectionable noise or drafts found during testing, adjusting, and balancing. All deficiencies shall be corrected prior to final balancing.
- D. Upon completion of final balancing, provide updated report indicating thermal performance testing and changes to system during final balancing for all control modes including updated airflows, pressures, velocities, etc. Final report shall be submitted prior to substantial completion.

1.04 QUALITY ASSURANCE

- A. Obtain services of an independent testing organization to perform testing and balancing work. The organization shall have a certified membership in the Associated Air Balance Council (AABC) or certification by the National Environmental Balancing Bureau (NEBB).
- B. Division 23 shall provide a technician and/or controls contractor to observe and assist in balancing the system. Balancing report must include verification of participation, including name and contact information of assisting party.

PART 2—PRODUCTS

2.01 BALANCING EQUIPMENT

- A. CONTRACTOR shall have the following minimum equipment for balancing systems:
 - 1. Duct air velocities below 1,000 fpm: Pitot tube and Micro-Manometer or Alnor velometer and duct-jet using zero to 1,000 fpm range.
 - 2. Water Flows: Ultrasonic Doppler Flow Meter for water systems.
 - 3. Supply Register Velocities: Alnor velometer and applicable jet or Anemotherm.
 - 4. Fan Rotative Speed: Timec tachometer or RPM counter and stop watch (1-minute reading, minimum).
 - 5. Contact pyrometer 0 to 300°F range.
 - 6. Amprobe model RS-3, or equal.
 - 7. Calibrated pressure gauge (0 to 100 feet water head).
 - 8. Inclined manometer 0 to 30 inches of water.
 - 9. Instruments used for measurements shall be accurate, and calibration shall be calibrated by the manufacturer or an AABC-approved method.
 - 10. Instruments shall be applied in accordance with manufacturer's instructions.
- B. All instruments used for measurements shall be accurate, and calibration histories for each instrument to be available for examination upon request. Calibration and maintenance of all instruments to be in accordance with the requirements of NEBB or AABC Standards.

PART 3—EXECUTION

3.01 PRELIMINARY BALANCING

- A. Division 23 shall provide an experienced installer to review the air distribution system with the testing and balancing agency for completion to confirm the test openings and volume dampers indicated on the Drawings or called for in the specifications are installed, that

dampers are in the open position, that the fans operate properly during all control modes, air filters are clean, and that the system is ready for balancing. Add test openings, volume dampers, air scoops, deflectrols, turning vanes, etc., as required. Adjust and change fan drives and belts, remove and reinstall ceilings, air terminals, access doors, and air devices as required to balance the system. Maintain the air handling equipment in good operating condition during the testing and balancing procedures.

3.02 PRESSURE DIAGRAM

- A. Provide a diagram indicating, at minimum, the static pressure at the following points while system is operating at 100% airflow.
 - 1. Supply fan inlets and outlets.
 - 2. Exhaust fan inlets and outlets.
- B. Diagram shall include all components in an air handling unit and additional pressure points as required in thermal performance testing.
- C. Coordinate with Division 23 and equipment manufacturer to obtain readings where access is difficult or limited. Lack of readings due to inaccessibility will not be accepted.

3.03 SCHEDULE OF TOLERANCES

- A. Final air system measurements shall be within the following range of specified cfm:
 - 1. Fans: 0% to +10%.
 - 2. Supply grilles, registers, diffusers: 0% to +10%.
 - 3. Return/exhaust grilles, registers: 0% to -10%.

3.04 GENERAL REQUIREMENTS

- A. Perform testing, balancing, and adjusting procedures in accordance with AABC or NEBB, unless specified below.
- B. Contact the temperature control contractor for assistance in operation and adjustment of controls during testing, adjusting, and balancing procedures. Cycle controls and verify proper operation and setpoints. Include in report description of temperature control operation for all control modes and any deficiencies found.
- C. Permanently mark equipment settings, including damper and valve positions, control settings, and similar devices allowing settings to be restored. Set and lock memory stops.
- D. Division 23 shall correct any installation deficiencies found by the test and balance agency that were specified and/or shown on the Contract Documents to be performed as part of that division of work, including sheave and pulley replacement or corrections to the controls system. Test and balance agency shall notify CONTRACTOR of these items and instructions will be issued to Division 23 for correction of the deficient work. Testing and balancing reports shall be submitted only after all deficiencies have been corrected and balancing completed upon the corrected system.

3.05 THERMAL PERFORMANCE TESTING

- A. Measure and record system measurements for each system described below during all control modes. Measurements shall be taken with airflows at 100% and coils at 100% capacity. CONTRACTOR shall make provisions for seasonal testing.
- B. Electric Heating Coils:
 - 1. Coil location.
 - 2. Actual airflow during testing.
 - 3. Design and actual entering air temperature (dry bulb and wet bulb).
 - 4. Design and actual leaving air temperature (dry bulb and wet bulb).
 - 5. Actual pressure drop across the coil.
 - 6. Actual voltage and amperage (each phase).

END OF SECTION

SECTION 23 07 13

DUCTWORK INSULATION FOR HEATING, VENTILATION, AND AIR CONDITIONING

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes:
 - 1. Rigid Board Fiberglass Insulation.
 - 2. Adhesives, Mastic, Sealants, and Reinforcing Materials.
 - 3. Jacketing.
 - 4. Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. ASTM B117—Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM C168—Standard Terminology Relating to Thermal Insulation.
 - 3. ASTM C272—Water Absorption of Core Materials for Sandwich Constructions.
 - 4. ASTM C547—Standard Specification for Mineral Fiber Pipe Insulation.
 - 5. ASTM C518—Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C591—Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - 7. ASTM C612—Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 8. ASTM C871—Standard Test Method for Chemical Analysis of Thermal Insulation Materials.
 - 9. ASTM C916—Standard Specification for Adhesives for Duct Thermal Insulation.
 - 10. ASTM C1071—Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
 - 11. ASTM C1290—Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
 - 12. ASTM C1427—Standard Specification for Extruded Preformed Flexible Cellular Polyolefin Thermal Insulation in Sheet and Tubular Form.
 - 13. ASTM D1000—Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
 - 14. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 15. ASTM E96—Standard Test Methods for Water Vapor Transmission of Materials.
 - 16. FED L-P-535E: Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) And Poly (Vinyl Chloride-Vinyl Acetate), Rigid.
 - 17. EPA Method 8260B—Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (Gc/Ms).

18. NFPA 262—Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, and fitting materials, along with safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect insulation before, during, and after installation.
- E. All scratched, dented, and otherwise damaged insulation shall be repaired or replaced at no additional cost to OWNER.

1.06 GENERAL REQUIREMENTS

- A. Unless otherwise indicated, all duct covering, jackets, insulation, vapor barriers, adhesive, and mastics shall have flame spread rating of 25 or less and smoke spread rating of 50 or less when tested in accordance with ASTM E84.
- B. Exposed ductwork shall be painted in accordance with Section 09 91 00—Painting. CONTRACTOR shall coordinate colors with OWNER.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with

each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 RIGID BOARD FIBERGLASS INSULATION

- A. Acceptable manufacturer is Johns Manville Spin-Glas Series 814, Owens Corning Type 703, or Knauf Insulation Board.
- B. Insulation shall be mineral fiber type conforming to ASTM C612.
- C. Minimum nominal density shall be 3 lbs/ft³.
- D. K-factor shall not exceed 0.23 (btu-in)/(hr-ft²-°F) at 75°F mean.
- E. Insulation shall be rated for service to 450°F.

2.02 ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

- A. Products shall be compatible with surfaces and materials on which they are applied and shall be suitable for use at operating temperatures of systems to which they are applied.
- B. All adhesives used for ductwork insulation shall conform to ASTM C916, Type II.
- C. Fiberglass Insulation Adhesive—Acceptable Manufacturers: Foster 85-60; Childers CP-127; and Duro Dyne SSG.
- D. Acoustical Ductwork Adhesive—Acceptable Manufacturers: Foster 81-10, or equal.
- E. Vapor Retarding Mastic:
 - 1. Acceptable Manufacturers: Foster 30-65 Vapor Fas, Childers CP-34, and Vimasco 749.
 - 2. For ductwork insulation operating below 50°F, mastic water vapor permeance shall be less than 0.03 perms at 45 mils dry film thickness conforming to ASTM E96.
 - 3. Use insulation joint sealant at all joints. Acceptable manufacturers are Foster 95-50 Flextra, Childers CP-76 Chil-Byl, or Pittsburgh Corning CW Sealant.
- F. Weather Barrier Breather Mastic:
 - 1. Acceptable Manufacturers: Foster 46-50 Weatherite, Childers Vi-Cryl CP-10/CP-11, or Vimasco WC-5.
 - 2. For ductwork insulation operating at 50°F or above, mastic water vapor permeance shall be greater than 1.0 perms at 1/16-inch dry film thickness conforming to ASTM E96.

- G. Sealant for Metal Jacketing—Acceptable Manufacturers: Foster 95-44 Elastolar; Childers CP-76 Chil-Byl; and Pittsburgh Corning 727.

2.03 JACKETING

- A. Self-Adhering Jackets (SAJ):
1. Acceptable manufacturers are 3M VentureClad 1577CW, or equal.
 2. Jackets shall be 5-ply, self-adhering, multiple-laminated waterproofing material with reflective aluminum foil, high-density polymer films, and cold weather acrylic adhesive providing zero (0.0) moisture permeance.
 3. Jackets in corrosive (NEMA 4X) or GMP areas shall be 3M VentureClad 1577CW-WM, 4-ply polyvinyl fluoride, self-adhering, multiple-laminated waterproofing material with reflective aluminum foil, high-density polymer films, and cold weather acrylic adhesive providing zero (0.0) moisture permeance. Jacket shall meet the requirements of FDA Regulations 21 175.105 and 21 175.125 for adhesives in indirect contact with human food.
 4. Minimum material thickness shall be 6 mils.
 5. Minimum puncture resistance shall be 25 lbs conforming to ASTM D1000.
- B. PVC Jackets (PVJ):
1. PVC film, gloss finish one side, semi-gloss other side.
 2. PVC film shall conform to FED L-P-535E, Composition A, Type II, Grade GU.
 3. Jacket thickness shall be minimum 0.03 inch.

2.04 ACCESSORIES

- A. All products shall be compatible with surfaces and materials on which they are applied and be suitable for use at operating temperatures of the systems to which they are applied.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
- C. Insulation bands shall be 3/4-inch wide, constructed of aluminum or stainless steel. Minimum thickness shall be 0.015 inch for aluminum and 0.010 inch for stainless steel.
- D. Staples shall be clinch style.
- E. Tack fasteners shall be stainless steel ring grooved shank tacks.
- F. Joint sealants and metal jacketing sealants shall be non-shrinking and permanently flexible.

PART 3—EXECUTION

3.01 GENERAL

- A. All insulation damaged during construction shall be replaced in accordance with these specifications.
- B. All insulation shall be applied in accordance with the manufacturer's written recommendations. Destructive methods such as sheet metal screws are not acceptable.

- C. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.
- D. All duct insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required.

3.02 RIGID BOARD FIBERGLASS INSULATION INSTALLATION

- A. Provide finished edges at all access doors and ends of insulation.
- B. Provide additional insulation trim pieces over flanged ductwork joints to completely insulate and seal to the thickness specified.
- C. For exterior ductwork, insulate duct such that minimum thickness is maintained and is sloped/peaked to shed water.
- D. Flexible connections from ducts to HVAC equipment shall not be insulated.

3.03 PROTECTIVE JACKET INSTALLATION

- A. Foil Scrim Jackets (FSJ): Install according to manufacturer's recommendations using factory supplied lap seals and butt strip seals.
- B. PVC Fitting Covers and Jackets (PVJ): Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4 inches without fasteners where required to absorb expansion and contraction. For sections where jacket requires routine removal, tack fasteners may be used. Secure PVC fitting covers with tack fasteners. For all other systems, apply a 1 1/2-inch band of mastic over ends, throat, seams and penetrations.

3.04 DUCTWORK INSULATION

- A. Provide insulation on new ductwork as indicated in the following schedule:

Service	Insulation	Jacket	Thickness
Outside Air Ducts	Rigid Board Fiberglass	SAJ	2.0"
Exposed Supply Ducts in Mechanical Rooms	Rigid Board Fiberglass	SAJ	2.0"
Exhaust/Relief Ducts from Exterior to 12 Inches Beyond Damper	Rigid Board Fiberglass	SAJ	2.0"
Intake and Exhaust Damper Frames	Rigid Board Fiberglass	SAJ	2.0"
All Ductwork Associated with Supply Fans	Rigid Board Fiberglass	SAJ	2.0"

3.05 SPECIAL AREAS

- A. All areas indicated on the Drawings as "Corrosive" or NEMA 4X shall include PVJ.

END OF SECTION

SECTION 23 07 19

PIPING INSULATION FOR HVAC

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes insulation for all piping provided under Division 23.
 - 1. Flexible Closed Cell Pipe Insulation.
 - 2. Adhesives, Mastic, Sealants, and Reinforcing Materials.
 - 3. Jacketing.
 - 4. Pipe Corrosion Protection System.
 - 5. Insulation Inserts and Pipe Shields.
 - 6. Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASTM C168—Standard Terminology Relating to Thermal Insulation.
 - 2. ASTM C272—Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
 - 3. ASTM C518—Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM C533—Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
 - 5. ASTM C547—Standard Specification for Mineral Fiber Pipe Insulation.
 - 6. ASTM C591—Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - 7. ASTM C612—Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 8. ASTM C871—Standard Test Method for Chemical Analysis of Thermal Insulation Materials.
 - 9. ASTM C1427—Standard Specification for Extruded Preformed Flexible Cellular Polyolefin Thermal Insulation in Sheet and Tubular Form.
 - 10. ASTM D1000—Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
 - 11. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 12. ASTM E96—Standard Test Methods for Water Vapor Transmission of Materials.
 - 13. FED L-P-535E: Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) And Poly (Vinyl Chloride-Vinyl Acetate), Rigid.
 - 14. NFPA 262—Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00–Submittals.
- B. Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, and fitting materials, along with safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All insulation or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.
- C. Insulation systems shall be applied by experienced contractors. Within the past five years, CONTRACTOR shall be able to document the successful completion of a minimum of three projects of at least 50% of the size and similar scope of the work specified in this section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in accordance with Section 01 60 00–Materials and Equipment.
- B. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage.
- C. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- D. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- E. Use all means necessary to protect insulation before, during, and after installation.
- F. All scratched, dented, and otherwise damaged insulation shall be repaired or replaced as requested by OWNER without additional cost to OWNER.

1.06 GENERAL REQUIREMENTS

- A. Unless otherwise indicated, all pipe covering, jackets, insulation, vapor barriers, adhesives, and mastics shall have flame spread rating of 25 or less and smoke spread rating of 450 or less when tested in accordance with ASTM E84.
- B. All insulation and associated materials shall be free of asbestos.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 FLEXIBLE CLOSED-CELL PIPE INSULATION

- A. Acceptable manufacturers are K-flex Insul-tube, Armacell AP/Armaflex, or equal.
- B. Insulation shall be flexible closed-cell type conforming to ASTM C534, Type 1, Grade 1.
- C. K -factor shall not exceed 0.25 (btu-in)/(hr-ft²-°F) at 75°F mean.
- D. Insulation shall be rated for service range of -20°F to 220°F on piping or 180°F where adhered to equipment.

2.02 ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

- A. Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.
- B. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 JACKETING

- A. Protective Metal Jackets (PMJ):
 - 1. Acceptable manufacturers are Metal-Clad, or equal.
 - 2. All metal jackets shall include safety edges.
 - 3. Outdoor installations: 0.024-inch-thick aluminum 304 stainless steel with safety edge.

2.04 INSULATION INSERTS AND PIPE SHIELDS

- A. Acceptable manufacturers are B-Line, Pipe Shields, or Value Engineered Products.
- B. Construct inserts with calcium silicate or polyisocyanurate with minimum 140 psi compressive strength. Piping 12 inches and larger shall be supplemented with high density

600 psi structural calcium silicate insert. Provide 16-gauge galvanized steel shield, 12 inches long. Insert and shield shall include minimum 180 degree coverage on bottom supported piping and full 360 degree coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution stainless steel plate. In corrosive (NEMA 4X) or hazardous (Class I, Division 1) environments, shields and distribution plates shall be constructed of 316 stainless steel.

- C. Where CONTRACTOR proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/premanufactured product described above. On low temperature systems, high density rigid polyisocyanurate may be substituted for calcium silicate provided insert and shield length and shield gauge are increased to compensate for lower insulation compressive strength.
- D. Wood blocks will not be accepted.
- E. All pipe shields shall be banded to the jacketing using stainless steel bands. One band is required on each side of the support.

2.05 ACCESSORIES

- A. All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
- C. Insulation bands shall be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness shall be 0.015-inch for aluminum and 0.010-inch for stainless steel.
- D. Load distributing metal shields shall be constructed of aluminum or stainless steel. Minimum thickness shall be 0.015-inch for aluminum and 0.010-inch for stainless steel.
- E. Staples shall be clinch style.
- F. Tack fasteners shall be stainless steel ring grooved shank tacks.
- G. Joint sealants and metal jacketing sealants shall be non-shrinking and permanently flexible.

PART 3-EXECUTION

3.01 GENERAL

- A. All insulation damaged during construction shall be replaced in accordance with these specifications.
- B. All insulation shall be applied in accordance with the manufacturer's written recommendations. Destructive methods such as sheet metal screws are not acceptable. All pipe insulation shall be installed with joints butted firmly together.

- C. All valves and fittings shall be insulated with mitered sections of insulation equal in density and thickness to adjoining insulation.
- D. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.
- E. All pipe insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required.
- F. All uninsulated penetrations through the insulation system shall be insulated along their length to a minimum distance of four times the insulation thickness. To prevent moisture migration behind the insulation, these penetrations shall be sealed with a sealant as recommended by the manufacturer and flashed to shed water.

3.02 SUPPORT INSTALLATION

- A. For each pipe hanger, provide a hanger block on the bottom half of the pipe in place of the insulation.
- B. Pipe hangers and supports shall be sized large enough to be installed over the outer surface of the insulation.
- C. Load distributing metal shields shall be installed around the lower one-third circumference of the insulation and jacket.
- D. Blocks and shields shall be provided at all supports regardless of orientation, except inserts may be omitted on 3/4 inch and smaller copper piping provided 12-inch long 22 gauge pipe shields are used.

3.03 FLEXIBLE CLOSED CELL INSULATION INSTALLATION

- A. Where practical, slip insulation on piping during pipe installation while pipe ends are open. Miter cut fittings allowing sufficient length to prevent stretching. Completely seal seams and joints for vapor tight installation. Apply full bed of adhesive to both surfaces. Cover flexible closed cell insulation on systems operating below 40°F with vapor retarding mastic.

3.04 PROTECTIVE JACKET INSTALLATION

- A. On systems operating at 50°F and above, pipe insulation jackets may be stapled using outward clinch staples spaced 3 inches apart at least 1/4 inch in from the lap edge. Mastics used shall be "breather" type allowing passage of water vapor.
- B. Protective Metal Jacket (PMJ): Lap seams a minimum of 2 inches. Secure with metal bands for end-to-end joints, and rivets or sheet metal screws for longitudinal joints. Rivets, screws, and bands shall be constructed of the same material as the jacket. Locate seams on bottom for exterior applications. Seal laps with 1/8-inch bead of metal jacketing sealant to prevent water entry.

3.05 PIPING INSULATION

A. Provide insulation and jacketing on new piping as indicated in the following schedule:

SERVICE	INSULATION	JACKET	INSULATION THICKNESS BY PIPE SIZE				
			< 1"	1" to < 1 1/2"	1 1/2" to < 4"	4" to < 8"	8" and Larger
Refrigerant Suction	Flexible Closed Cell	NA	1.0"	1.0"	1.5"	1.5"	1.5"

- B. For systems with operating fluid temperatures 65°F or less, furnish and install removable flexible closed cell insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel. Covers shall be tight fitting to provide a complete vapor retarding barrier. Examples include but are not limited to:
1. Flow sensing devices.
 2. Circuit setters.
 3. Drain valves.
 4. Equipment labels.
- C. All piping exterior to buildings shall be provided with a PMJ jacket.

END OF SECTION

SECTION 23 09 13

TEMPERATURE CONTROLS AND INSTRUMENTATION

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Electrical Components.
 - 2. Thermostats.
 - 3. Dampers and Actuators.
 - 4. Thermistor (Pipe Temperature).
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit under provision of Section 01 33 00—Submittals.
- B. Submittal shall include control schematics with wiring and logic diagrams in addition to equipment information. All wiring shall be color coded and labeled at each end with corresponding numbers in accordance with Section 20 05 53—Identification for Fire Suppression, Plumbing, and HVAC Piping and Equipment. This numbering shall be shown on the shop and record drawings. Wiring diagrams shall be job-specific and indicate all point-to-point wiring connections. Manufacturer's standard wiring diagrams are not acceptable.

1.03 QUALITY ASSURANCE

- A. Temperature control equipment including panels and other standard marketed apparatus shall bear the nameplate of the manufacturer. The entire system including temperature control wiring shall be installed by mechanics employed by or under contract to the temperature control provider, a factory-licensed distributor, or factory-licensed dealer. The provider shall be responsible for the quality and satisfactory operation of all materials.
- B. All control panels shall bear a serialized UL label.
- C. Comply with the National Electrical Code (NFPA 70) and any and all local codes as applicable to construction of electrical wiring devices, material, and equipment herein specified.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be

included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ELECTRICAL COMPONENTS

- A. Provide electrical work in accordance with Division 26. All line voltage wiring and conduit shall be provided by Division 26 contractor. All low voltage wiring (100 volts and below) shall be provided by temperature controls contractor and be installed in raceways provided by Division 26 contractor.
- B. Provide all components necessary to complete the work of this section including, but not limited to relays, transformers, motors, solenoid valves, starters, switches, override controls, operator linkages, and associated low voltage wiring. Outdoor equipment shall be NEMA 4X, or as indicated.
- C. All relays, time clocks, transformers, motors, operator linkages, wiring, etc., not specifically mentioned herein but necessary to make the control system complete and operative in accordance with the sequence of operation shall be provided as part of this section.
- D. All boxes for thermostats shall be provided by Division 26 contractor.
- E. All control and auxiliary relays shall have indicating LEDs.
- F. Pushbuttons shall be heavy-duty, oil-tight, 30 mm, flush head style.
- G. Indicating lights shall be heavy-duty, oil-tight, 30 mm, push-to-test type.
- H. Selector switches shall be heavy-duty, oil-tight, 30 mm.
- I. Temperature control contractor shall utilize a licensed electrician for installation of all conduit and wiring. TCC shall submit name and license number of electrician with shop drawings.

2.02 THERMOSTATS

- A. Line voltage thermostats shall be provided by Division 26.

2.03 DAMPERS AND ACTUATORS

- A. Outside Air Intake and Exhaust Outlet:
 - 1. Dampers shall be TAMCO Series 9000 BF, Alumavent Series 3900SS, or Arrow AFDTI-25LT, thermally insulated control damper with aluminum construction.

Dampers for corrosive environments shall be TAMCO Series 9000 SW provided with an anodized coating and stainless steel linkage.

2. Dampers shall be parallel blade.
3. Extruded aluminum (6063T5) damper frame shall be thermally broken, minimum 0.080 inch thickness. Damper frame to be 4 inches deep and shall be insulated with polystyrene on four sides. Damper shall be rated at a leakage of less than 8.0 cfm per square foot at 4.0 inches of water column pressure differential at 20°F.
4. Blades to be extruded aluminum (6063T5), internally insulated with non-CFC, expanded polyurethane foam and shall be thermally broken. Complete blade shall have an insulating factor of R-2.29 and a temperature index of 55 as tested in accordance with AMCA Standard 511.
5. Blade gaskets shall be extruded EPDM; blade seals shall be silicone.
6. Shaft to actuator shall be hex type, material to match damper construction.
7. Side seals shall be silicone.
8. Dampers shall be flanged to duct type. Clear opening in damper shall be same size as ductwork.

B. Actuators:

1. Actuators shall be Belimo NFBUP, Honeywell MS4110, or Siemens GCA, maintenance-free actuator rated at minimum 88 in-lb. of torque. Dampers shall be power-to-open, spring-closed unless otherwise specified. Provide auxiliary switch where noted on Drawings. Actuator shall be capable of accepting 120-volt power for operation and control.
2. Actuators shall include electronic overload protection and visual position indication throughout range of motion.
3. Actuators shall include a manual override via a manufacturer-supplied hex crank.
4. All actuators shall be direct-coupled to damper and mounted outside the air stream utilizing TAMCO motor mounting bracket model AL-0001, or equal unless otherwise noted. CONTRACTOR shall verify suitability of mounting bracket prior to ordering.
5. If auxiliary switch is not used, terminate cord in nearest junction box.
6. All actuators shall be of the same manufacturer. Manufacturer shall be responsible for furnishing quantity of actuators required to meet minimum damper torque rating, plus an additional 10% torque.
7. Provide Greenheck, or equal, NEMA 4X, plastic enclosure for actuators in corrosive or NEMA 4X rated environments.

2.04 THERMISTOR (PIPE TEMPERATURE) (TE)

- A. Thermistor shall be Bell and Gossett 104502 for Ecocirc 20-18 recirculation pump , or equal. CONTRACTOR shall provide thermal grease and strap extension with the unit.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install all equipment in accordance with manufacturer's recommendations and Division 26.
- B. Coordinate location of exposed devices prior to rough-in. Thermostats shall be mounted where shown on the Drawings. Thermostats on exterior walls shall have insulated bases.

- C. Temperature controls to be installed in or on insulated ductwork shall be installed after the insulation has been applied.
- D. Thermostats, humidistats, etc. shall be installed 48 inches above floor (top of box), unless otherwise noted. Notify ENGINEER of conflicts.
- E. Install all dampers in accessible locations with ample space to install direct-coupled actuator, housing and accessories.

3.02 SEQUENCE OF OPERATION

- A. Gas unit heaters (GUH) shall be controlled by a low-voltage remote-mounted thermostat furnished by the manufacturer with fan on when room temperature falls below thermostat setpoint. Provide wiring between thermostat and unit heater. Control power shall be from control power transformer at unit.
- B. Dehumidifiers (DH) shall be controlled by their integral humidistat.
- C. Electric wall heaters (EWH) shall be controlled by an integral thermostat.
- D. Controls for electric unit heaters (EUH) shall be provided by Division 26 contractor. Thermostats shall be suitable to meet room electrical rating. Control power shall be from control power transformer at unit.
- E. Devices and control logic for the following fans shall be provided by the Division 26 contractor. Refer to Section 26 09 00—Controls and Instrumentation.
 - 1. EF-15-01.
 - 2. EF-15-02.
 - 3. SF-15-01.
 - 4. EF-20-01.
 - 5. EF-20-03.
 - 6. SF-20-01.
- F. The following fans shall be controlled by a room fan switch. Provide all required interfaces with the switch and coordinate switch type. Speed control for fans shall be for balancing only and shall be inaccessible to room occupants.
 - 1. EF-15-03.
 - 2. EF-20-02.
- G. Electric duct heaters (EDH) shall be controlled by a duct thermostat furnished by the manufacturer and installed by the temperature controls contractor in raceways provided by Division 26 contractor.
- H. Split Systems: Split system air conditioners shall be controlled by wired controllers furnished by the manufacturer. The associated air-cooled condensing unit shall start and the fan shall cycle when room temperature rises above thermostat setpoint. The fan and associated air-cooled condensing unit shall be off when the room temperature is below the cooling setpoint. The associated heat pump (SS-15-03 only) shall start and the fan shall cycle when room temperature falls below the thermostat setpoint for heating, and shall be turned off when room is above the heating setpoint.

END OF SECTION

SECTION 23 11 23
FACILITY FUEL GAS PIPING

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: All facility fuel gas pipe and fittings, unless otherwise noted.
- B. Related Sections and Divisions: Applicable provisions of Division 01 govern work under this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. NFPA 54–National Fuel Gas Code (Current Edition).
 - 2. ANSI B16.3–Malleable Iron Threaded Fittings.
 - 3. ASTM A53–Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
 - 4. ASTM A234–Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
 - 5. 2021 International Fuel Gas Code.

1.03 QUALITY ASSURANCE

- A. All materials, equipment and Work shall meet or exceed all applicable federal, state and local requirements and conform to codes and ordinances of authorities having jurisdiction.
- B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- C. Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.

1.04 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept piping on-site in shipping containers with labeling in place, inspect for damage and store with a minimum of handling. Store plastic piping under cover out of direct sunlight. Do not store materials directly on the ground.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

- C. Protect piping systems from entry of foreign materials by installing temporary covers, completing sections of the work and isolating parts of completed system.
- D. Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place.

1.06 DESIGN CRITERIA

- A. Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications as listed in this specification.
- B. Construct all piping for the highest pressures and temperatures in the respective system in accordance with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.
- C. Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in occupied spaces and ventilation plenum spaces, including plenum ceilings.
- D. Use only long radius elbows having a centerline radius of 1.5 pipe diameters.
- E. Where ASTM A53 grade A pipe is specified, ASTM A53 grade B pipe may be substituted at CONTRACTOR's option. Where the grade or type is not specified, CONTRACTOR may choose from those commercially available.

1.07 WELDER QUALIFICATIONS

- A. Before any metallic welding is performed, CONTRACTOR to submit their Standard Welding Procedure Specification together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code and/or the National Certified Pipe Welding Bureau.
- B. Before any polyethylene fusion welding is performed, CONTRACTOR to submit certification that the welders to be used on this project have successfully demonstrated proper welding procedures in accordance with the Code of Federal Regulations, Title 49, Part 192, Section 192.285.
- C. ENGINEER and OWNER reserves the right to test the work of any welder employed on the project, at CONTRACTOR's expense. If the work of the welder is found to be unsatisfactory, the welder shall be prevented from doing further welding on the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state, and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
- B. Natural gas pressures shall not exceed 5 psig on customer side of the meter.
- C. Buried natural gas shall be by utility provider.

2.02 NATURAL GAS

- A. 2-Inch and Smaller: ASTM A53, type E or S, standard weight (Schedule 40) black steel pipe with ASTM A197/ANSI B16.3 class 150 black malleable iron threaded fittings or ASTM A234 grade WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.
- B. Exposed piping shall be painted in accordance with Section 09 91 00–Painting. All aboveground piping shall be labeled in accordance with Section 20 05 53–Identification for Fire Suppression, Plumbing, and HVAC Piping and Equipment. Where not labeled on manufacturer nameplate, regulator tags shall indicate inlet pressure, outlet pressure, and flow. Appliance regulators provided by equipment manufacturer as part of a manufacturer's gas train are not required to be tagged.

2.03 VENTS AND RELIEF VALVE DISCHARGE PIPING

- A. Use pipe and pipe fittings as specified for the system to which the relief valve or vent is connected.

2.04 UNIONS AND FLANGES

- A. 2-Inch and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping. Use unions of a pressure class equal to or higher than that specified for the fittings of the respective piping service but not less than 250 psi.
- B. 2 1/2-Inch and Larger: ASTM A181 or A105, grade 1 hot forged steel flanges of threaded, welding and of a pressure class compatible with that specified for valves, piping specialties and fittings of the respective piping service. Flanges smaller than 2 1/2-inch may be used as needed for connecting to equipment and piping specialties. Use raised face flanges ANSI B16.5 for mating with other raised face flanges on equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment.

- C. Provide ASTM A 193 B7 grade bolts and A 194 2H grade nuts and hardened washers for connections (star washers for grounding).

2.05 GASKETS

- A. Fuel Oil and Natural Gas Systems: Branded, compressed, non-asbestos sheet gaskets. Klingsil C4401, Garlock 3000, or JM Clipper 978-C.

PART 3-EXECUTION

3.01 PREPARATION

- A. Remove all foreign material from interior and exterior of pipe and fittings.

3.02 INSTALLATION

- A. Support:
1. All interior or exposed pipelines shall be securely supported by adjustable metal saddles, brackets, or adjustable hangers supported directly by concrete, masonry work, or tile.
 2. Strap hangers, tin clips, or U-hooks will not be acceptable.
 3. In general, the maximum spacing of supports shall not exceed 10 feet on centers.
 4. Insulation saddles shall be used. CONTRACTOR shall furnish and place hangers, supports, wall pipes, sleeves, and floor boxes in the forms before concrete is poured wherever needed or shown on the Drawings.
 5. The weight of the piping shall be supported independently of connected equipment.
 6. All supports and parts shall conform to the latest requirements of ASME B31 and shall have a structural safety factor of 5. Accurate weight balance calculation shall be made by CONTRACTOR to determine the required supporting force at each hanger location and the pipe weight load at each equipment connection. CONTRACTOR shall be responsible for the installation and application of the supports. Pipe hangers shall be capable of supporting the pipe weight load in all conditions of operation. The hangers shall allow free expansion and contraction of the piping to prevent excessive stress in the piping. Hangers and supports shall be spaced in accordance with ASME B31 and as indicated in this specification. Pipe supports shall be placed before and after a valve, expansion joint, or equipment so that stress will not be transferred to them.
 7. CONTRACTOR shall provide calculations of pipe supports if requested by ENGINEER.
 8. The following maximum spacings shall be provided for supports:

MAXIMUM HORIZONTAL PIPE
HANGER AND SUPPORT SPACING

Nominal Pipe or Tube Size	Black Steel (See Note 1) ft
3/4	8
1	8
1 1/4	8
1 1/2	8
2	10
2 1/2	10

Nominal Pipe or Tube Size	Black Steel (See Note 1) ft
3	10
4	10
5	10
6	10
8	10
10	10
12	10

Note 1: Provide at least one hanger per pipe length located as close to the flange or joint on barrel as possible.

9. The length of hanger span and support spacing in the above table refers to straight lengths of pipe. When there are changes of direction in pipe, two supports shall be placed less than three-fourths the full span in the table. When practical, a hanger shall be located immediately adjacent to a change in direction of piping. Where there are concentrated loads between supports such as valves, spacing shall be based on load calculations rather than this table.
10. Provide saddles or shields under piping hanger and supports for all insulated piping to prevent crushing of insulation. Provide stainless steel pipe shields under stainless steel piping to prevent indentation of piping from the support or clamp.
11. Vertical piping shall be supported at each floor level and at intervals as specified for horizontal piping.

B. Penetrations:

1. Where pipes pass through concrete members without wall fittings shown, CONTRACTOR shall provide sleeves in the forms for the piping.
2. The sleeve diameter shall not exceed the pipe O.D. (or flange O.D. where applicable) plus 2 inches, unless otherwise shown on Drawings.
3. If the concrete members are to be watertight, the annular space around the pipe shall be sealed with an approved mechanical seal.
4. Where pipes pass through a roof, they shall be run through an approved roof penetration with flashing and counter-flashing.
5. Where pipes pass through nonwatertight walls, the annular space shall be grouted full.
6. Where pipes pass through nonwatertight floors, the sleeve shall extend 1-inch above the finished floor elevation, and the annular space shall remain open.
7. Space between wall sleeve or wall pipe and concrete shall be filled with nonshrinking mortar.
8. The annular space between the wall sleeve and pipe shall be sealed with an approved mechanical seal.
9. Where new pipes go through existing nonwatertight concrete or masonry members, holes shall be cored and grouted full (walls), remain open (floors).
10. Plug abandoned pipes and wall pipes, after pipe and fitting removal, flush to the concrete surface with nonshrinking mortar, or as otherwise acceptable, to achieve a watertight seal.
11. No chases or recesses shall be made in poured concrete for pipe installation, and no pipe shall run in poured concrete unless called for in the Drawings or Specifications or permitted by ENGINEER. The cutting or core drilling of concrete for pipe shall be avoided wherever possible, and in no case, where such cutting or core drilling is necessary, shall reinforcing rods be cut or disturbed without prior consultation with ENGINEER.

12. All openings for pipe work shall be neatly patched in a workmanlike manner.

C. Layout:

1. Install all piping parallel to building walls and ceilings and at heights that do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. In all cases, consult Drawings for location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
2. Exposed piping shall run straight, in neat parallel lines, and shall be located far enough from walls, ceilings and floors, to permit access for covering of pipe and painting work.
3. Care shall be taken in laying out piping that there is no interference with the proper location of piping for other purposes or other equipment, and shall be run with regard to the requirements of each service.
4. Piping shall not interfere with headroom or clear floor space.
5. Plates shall be provided on all uncovered pipes passing through floors, walls, and ceilings, constructed of materials other than poured concrete. Plates shall be on exposed sides and shall be chrome-plated, spring and snap type.
6. An ample number of unions shall be provided in all threaded, soldered, and glued pipelines and at all equipment to facilitate removal and replacement. Install a shutoff valve at each appliance.
7. In joining two dissimilar types of pipe, standard fittings shall be used when available. The proposed joint shall be submitted by CONTRACTOR to ENGINEER for review prior to installation.

3.03 ERECTION

- A. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.
- B. Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not acceptable.
- C. "Weldolets" and "Thredolets" may be used for branch takeoffs up to one-half the diameter of the main.
- D. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.

3.04 WELDED PIPE JOINTS

- A. Welding of pipe in normally occupied buildings is prohibited. Off-site welding is acceptable.
- B. If welding is required in a normally occupied building for connecting to an existing welded system, written approval from OWNER shall be obtained and shall comply with building's fire and life safety, as well as hot work requirements.
- C. Piping and fittings shall be welded and fabricated in accordance with ASME/ANSI latest editions of B31 for all systems from the Code for Pressure Piping. Machine beveling in CONTRACTOR's shop is preferred. Field beveling may be done by flame cutting to recognized standards.

- D. Provide complete penetration of deposited metal with base metal. Provide filler metal suitable for use with base metal. Maintain inside of fittings free from globules of weld metal.
- E. All welded pipe joints shall be made by the fusion welding process, employing a metallic arc or gas welding process. All pipes shall have the ends beveled 37 1/2 degrees and all joints shall be aligned true before welding. Except as specified otherwise, all changes in direction, intersection of lines, reduction in pipe size and the like shall be made with factory-fabricated welding fittings. Mitering of pipe to form elbows, notching of straight runs to form tees, or any similar construction shall not be permitted.
- F. Align piping and equipment so that no part is offset more than 1/16 inch. Set all fittings and joints square and true and preserve alignment during welding operation. Use of alignment rods inside pipe is prohibited.
- G. CONTRACTOR shall not permit any weld to project within the pipe so as to restrict it. Tack welds, if used, must be of the same procedure as the completed weld. Otherwise, remove tack weld during welding operation.
- H. Do not split, bend, flatten or otherwise damage piping before, during or after installation.
- I. Remove dirt, scale or other foreign matter from the inside of the piping, by swabbing or flushing, prior to the connection of other piping sections, fittings, valves or equipment.
- J. Schedule 40 pipe shall in no case be welded with less than three passes including one stringer/root, one filler and one lacer. Schedule 80 shall be welded with no less than four passes, including one stringer/root, two filler and one lacer. In all cases, the weld must be filled before the cap weld is added.
- K. Weld Testing:
 - 1. All welds are subject to inspection, visual and/or x-ray, for compliance with Specifications. OWNER will at OWNER's option, provide employees or employ a testing laboratory for the purposes of performing said inspections and/or x-ray testing. Initial visual and x-ray inspections will be provided by OWNER. CONTRACTOR shall be responsible for all labor, material and travel expenses involved in the reinspection and retesting of any welds found to be unacceptable. In addition, CONTRACTOR shall be responsible for the costs involved in any and all additional testing required or recommended by ASME/ANSI Standards B31.1 and B31.3 because of the discovery of poor, unacceptable or rejected welds.
 - 2. Welds lacking penetration, containing excessive porosity or cracks, or are found to be unacceptable for any reason, must be removed and replaced with an original quality weld as specified herein. All qualifying tests, welding and stress relieving procedures shall, moreover, be in accordance with Standard Qualification for Welding Procedures, Welders and Welding Operators, Appendix A, Section 6 of the Code, current edition.

3.05 THREADED PIPE JOINTS

- A. Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.06 NATURAL GAS

- A. Pitch horizontal piping down 1-inch in 60 feet in the direction of flow. Install a 4-inch minimum depth dirt leg at the bottom of each vertical run and at each appliance. When installing mains and branches, cap gas tight each tee or pipe end which will not be immediately extended. All branch connections to the main shall be from the top or side of the main.
- B. Do not install gas pipe in a ventilation air plenum.
- C. If an above ground vent terminates in an area subject to snow accumulation, terminate the line at least five feet above grade.
- D. Piping through a roof shall be run through an approved roof penetration with flashing and counter flashing.
- E. Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside of the building, terminated with a screened vent cap, and located according to gas utility regulations.
- F. Clean all welded piping before all regulators and control valves. Test by placing target cloth over piping and blow with compressed air. Clean piping until target cloth is clean and free of debris.

3.07 VENTS AND RELIEF VALVE DISCHARGE PIPING

- A. Install vent and relief valve discharge lines as indicated on the Drawings, as detailed, and as specified for each specific valve or piping specialty item. In no event is a termination to occur less than 6 feet above a roof line. Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside of the building, terminated with a screened vent cap, and located according to gas utility regulations.
- B. Pipe vents from gas pressure reducing valves and pipe casing sleeves to the exterior of the building and terminate with outlet turned down and capped with corrosion resistant insect screen. Vent terminations shall be at least 7 feet abovegrade or pedestrian traffic and a minimum of 3 feet above or 10 feet horizontally from all air intakes or building openings. Provide stainless steel insect screens on vent outlets.

3.08 UNIONS AND FLANGES

- A. Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.
- B. Provide dielectric isolation device where nonferrous lines connect to ferrous lines or equipment, such as dielectric union, coupling, or dielectric flange fitting.

3.09 PIPING SYSTEM LEAK TESTS

- A. Piping system shall be tested as a complete unit or in sections. Under no circumstances shall a valve in a line be used as a bulkhead between gas in one section and test medium in an adjacent section, unless two valves in series are installed with a valved "telltale" located between these valves.

- B. Verify that the piping system being tested is fully connected to all components and that all equipment is properly installed, wired, and ready for operation. If required for the additional pressure load under test, provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can withstand any additional weight load that may be imposed by the test.
- C. All natural gas systems shall be inspected, tested, purged and placed into operation in accordance with NFPA 54 and as required by local code. Tester shall submit pneumatic tests to ENGINEER.
- D. Conduct pressure test with air. Test time and pressure shall be as indicated in the table below; additional time may be necessary to conduct an examination for leakage. Each test must be witnessed by ENGINEER. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.

System	Pressure	Medium	Duration
Natural Gas	Test pressure shall be no less than 1.5 times the proposed maximum working pressure, but not less than 3 psi. Where the test pressure exceeds 125 psi, test pressure shall not exceed 50% minimum yield strength of pipe.	Air, carbon dioxide, nitrogen, or inert gas.	1/2 hour per 500 cubic feet pipe volume not to exceed 24 hours. Test duration shall be not less than 1/2 hour for each 500 cubic feet of pipe volume or fraction thereof. When testing a system having a volume less than 10 cubic feet the test duration shall be a minimum of 60 minutes. The duration of the test shall not be required to exceed 24 hours.

- E. Gradually increase the pressure to not more than one half of the test pressure; then increase pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. After testing is complete, slowly release the pressure in a safe manner.
- F. All necessary piping, fittings, blind flanges, and apparatus for conducting tests shall be furnished by CONTRACTOR and shall comply with the requirements of NFPA 54 and as required by local codes.
- G. All new rough-in distribution piping and affected portions of existing systems connected to, shall be subjected to a pneumatic test pressure utilizing clean, dry air and must be demonstrated to be absolutely tight when subjected to the pressures and time durations listed in table above. All equipment and components designed for operating pressures of less than the test pressure shall not be connected to the piping system during test.
- H. Test pressure shall be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record or indicate a pressure loss caused by leakage during the pressure test period.
- I. Piping system shall withstand test pressure specified without showing any evidence of leakage or other defects. Any reduction of test pressures as indicated by pressure gauges shall be deemed to indicate a leak unless can be attributed to some other cause.

- J. Leakage shall then be located by means of a gas detector, a noncorrosive leak detection fluid, or other leak detection method. Matches, candles, open flames or other methods that provide a source of ignition shall not be used.
- K. When placing system into operation, appliances and equipment shall not be placed into operation until piping system has been checked for leakage with above requirements.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1—GENERAL

1.01 SCOPE

- A. This section contains specifications for all refrigerant piping for this project. Included are the following topics:
 - 1. Refrigerant Piping.
 - 2. Refrigerant Piping Accessories.
 - 3. Refrigerant.

1.02 REFERENCE

- A. Applicable provisions of Division 01 govern work under this section.

1.03 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ANSI B16.22—Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASHRAE 15—Safety Standard for Refrigeration Systems.
 - 3. ASHRAE 32—Sustainable, High-Performance Operations and Maintenance.
 - 4. ASHRAE 34—Designation and Safety Classification of Refrigerants.
 - 5. ASME B31.5—Refrigeration Piping and Heat Transfer Components.
 - 6. ASTM B280—Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
 - 7. NFPA 70—National Electrical Code.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. CONTRACTOR shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

1.05 COPPER TUBE

- A. Statement from manufacturer on their letterhead that the pipe furnished meets the ASTM specification contained in this section.

1.06 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Order all copper refrigeration tube with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier; with soft straight lengths or coils identified with a tag indicating that the product was manufactured in accordance with ASTM B280; and with each hard temper straight length identified throughout its length by a blue colored marking not less than 3/16 inch in height and a legend at intervals of not greater than three feet that includes the designation "ACR" and pipe outside diameter.
- C. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to OWNER.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Promptly inspect shipments to review that the material is undamaged and complies with specifications.
- B. Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. If end caps are not present on tube bearing the "ACR" designation, clean and re-cap in accordance with ASTM B280. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.
- C. Offsite storage agreements will not relieve CONTRACTOR from using proper storage techniques.
- D. Storage and protection methods must allow observation to verify products.

1.08 DESIGN CRITERIA

- A. Use only new material, free of defects and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

1.09 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national

de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 REFRIGERANT PIPING

- A. Acceptable manufacturer is Streamline ACR Copper Tube, or equal.
- B. Piping shall be hard drawn copper tube, cleaned and capped in accordance with ASTM B280, and marked "ACR", with ANSI B16.22 wrought copper solder-type fittings. The piping shall have an operating pressure of 700 psi at 250°F.
- C. Precharged tubing line sets may be used on systems 3 1/2 tons and less in size.

2.02 REFRIGERANT PIPING ACCESSORIES

- A. Acceptable manufacturers are Sporlan, Alco, or equal.
- B. Provide all refrigerant piping specialties with a maximum working pressure of full vacuum to no less than the pressure vessel.
- C. Flexible Pipe Connectors: Double braided bronze hose flexible pipe connectors with solder end connections.

2.03 REFRIGERANT

- A. Refrigerant shall be R32.

PART 3-EXECUTION

3.01 PREPARATION

- A. Remove all foreign material from interior and exterior of pipe and fittings.

3.02 ERECTION

- A. Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. In all cases, consult Drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
- B. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment
- C. Do not install piping running through any elevator shaft, public stairway, stair landing, or means of egress.

- D. Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Make connections to all equipment installed by others where that equipment requires the piping services indicated in this section.

3.03 REFRIGERANT PIPING

- A. Refrigeration piping to be installed by firms who are experienced in installation of such piping and in accordance with the requirements of the International Mechanical Code.
- B. All brazing filler metals shall have a melting temperature above 1,400°F and contain a minimum of 6 percent silver.
- C. Tubing to be new and delivered to the job site with the original mill end caps in place. Clean and polish all joints before brazing. Avoid prolonged heating and burning during brazing. Purge all lines with nitrogen during brazing. Provide manual shut-off and check valves as required.
- D. No refrigerant is to be vented directly to the atmosphere except that which may escape through leaks in the system during leak testing. During evacuation procedures, use equipment designed to recover and allow recycling of the refrigerant.
- E. Systems erected on site which use A1 refrigerants and no piping larger than 0.62 inch in diameter shall be leak tested with refrigerant in accordance with ASHRAE 15 as follows. Leak test the system by charging the system to a pressure of 10 psig with an HFC refrigerant, with the compressor suction and discharge valves closed and with all other system valves open. Increase pressure to 300 psig with dry nitrogen. Rap all joints with a mallet and check for leaks with an electric leak detector having a certified sensitivity of at least one ounce per year. Seal any leaks that may be found and retest.
- F. After completion of the leak test, evacuate the system with a vacuum pump to an absolute pressure not exceeding 1500 microns while the system ambient temperature is above 60°F. Break the vacuum to 2 psig with the refrigerant to be used in the system. Repeat the evacuation process, again breaking the vacuum with refrigerant. Install a drier of the required size in the liquid line, open the compressor suction and discharge valves, and evacuate to an absolute pressure not exceeding 500 microns. Leave the vacuum pump running for not less than two hours without interruption. Raise the system pressure to 2 psig with refrigerant and remove the vacuum pump.
- G. Charge refrigerant directly from original drums through a combination filter-drier. Each drier may be used for a maximum of three cylinders of refrigerant and then must be replaced with a fresh drier. Charge the system by means of a charging fitting in the liquid line. Weigh the refrigerant drum before charging so that an accurate record can be kept of the weight of refrigerant put in the system. If refrigerant is added to the system through the suction side of the compressor, charge in vapor form only.

3.04 REFRIGERANT PIPING ACCESSORIES

- A. Install accessories in accordance with the manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 23 31 00

DUCTWORK AND DUCTWORK SUPPORTS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Duct Pressure/System Class.
 - 2. Duct Materials.
 - 3. Fasteners, Hangers and Supports.
 - 4. Duct Sealants and Gaskets.
 - 5. Ductwork Fabrication.

1.02 REFERENCES

- A. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Provide layout drawing for review prior to ductwork fabrication. Layout drawings shall be coordinated between all other trades prior to review.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 77 00—Contract Closeout.
- B. Record actual locations and sizes of ducts and duct fittings. Record changes in fitting location sizes and types. Show additional fittings used.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA—HVAC Duct Construction Standards—Metal and Flexible.

1.06 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain recommended minimum temperatures during and after installation of duct sealants.
- C. Ductwork shall be stored indoors or in durable, waterproof, abovegrade packing.

1.08 DUCTWORK DESIGN

- A. Duct layout and design shown on the Drawings are based on design of supply, return and exhaust system components. Any changes to the design for installation shall be submitted to and approved by OWNER and ENGINEER. Proposed changes shall be submitted with layout and pressure drop calculations. CONTRACTOR shall be responsible for the cost of any changes to the duct system or any system components.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Store products inside and protect from weather.

1.10 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 DUCT PRESSURE/SYSTEM CLASS

- A. Ductwork shall be constructed to the static pressure class as shown below, unless otherwise noted:
 - 1. Supply ductwork: 2-inch positive pressure class.
 - 2. Exhaust air ductwork: 2-inch negative pressure class.
 - 3. Outside air ductwork: 2-inch negative pressure class.

2.02 DUCT MATERIALS

- A. All sheet metal used for construction of duct shall be 24 gauge, or heavier, except for round ductwork 12 inches and smaller shall be 26 gauge where allowed by SMACNA.
- B. Galvanized steel ducts shall be ASTM A653 galvanized steel sheet, lock-forming quality, having G90 zinc coating of 1.25 ounces per square foot in conformance with ASTM A90. Sheet metal for ductwork noted or specified to be painted shall include "Paint Grip" finish.

- C. Glass Fiber Reinforced Plastic (FRP) Ducts:
1. Fiber-reinforced plastic ducts shall be as manufactured by Spunstrand, Composite Systems, or equal. Ductwork shall be glass fiber reinforced plastic conforming to ASTM D2996, ASTM D3982, and SMACNA Fibrous Glass Duct Construction Standards, with minimum 3/16-inch wall thickness.
 2. Where indicated on Drawings to be of nonflammable construction, duct shall be built to NBS PS 15 standards with inner epoxy resin rich carbon surfacing veil and a 100-mil corrosion barrier. The balance of construction shall be filament wound with a 6-ounce cloth exterior.
 3. FRP ducts shall, as a composite, not exceed a flame spread rating of 25 per UL 181.
 4. The inner surface shall contain a 10-mil-thick "C" veil saturated with a premium resin form above, (approximately 90% by weight resin) followed by a 100 mil corrosion barrier (two layers of 1 1/2 oz. chopped mat) with the same resin used on the 10-mil liner. The structural layer shall be as required for design service and shall be filament wound or contact-molded using resin as detailed above. Duct exterior finish shall have a relatively smooth surface free of exposed fibers and shall contain an ultraviolet inhibiting agent in the gel coat. Gel coat shall be gray. All resin and joint material shall be suitable for 200°F service.
- D. Stainless Steel Ducts: ASTM A240/A240M and A480/A480M, Type 316 as indicated on Drawings. Provide Number 2B finish for concealed work and number 3 finish for exposed work.
- E. All ductwork within corrosive or chemical room areas shall be stainless steel or FRP. Material proposed shall be compatible with corrosive vapors present in environment.

2.03 FASTENERS, HANGERS, AND SUPPORTS

- A. Ductwork shall be supported in accordance with SMACNA–HVAC Duct Construction Standards–Metal and Flexible. Secure wire method of support is not acceptable.
- B. Inserts and Fasteners:
1. Concrete inserts installed prior to pouring shall be manufactured inserts. Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Acceptable manufacturers include Hilti, Rawl, and Redhead.
 2. Concrete fasteners installed after pouring shall be epoxy-type.
 3. Fasteners for structural steel shall be beam clamps or welded studs. Stud locations shall be coordinated with structural engineer.
 4. Fasteners to ductwork shall be 316 stainless steel, unless otherwise indicated.
- C. Hangers:
1. Strip hangers shall be only used in concealed areas and shall be galvanized steel.
 2. Hanger rod shall be ASTM A36 galvanized steel for galvanized ducts or 316 stainless steel for ducts other than galvanized, unless noted otherwise. Rods shall be continuously threaded.
- D. Supports:
1. Duct support material shall be galvanized steel for galvanized duct. Material for supports in corrosive spaces shall be as noted below.
 2. Acceptable supports for trapeze hangers are steel angles or uni-strut. Exposed ductwork shall be supported by steel angle supports painted to match duct.

3. Riser supports shall be angles or channels secured to the sides of the duct with welds or fasteners.
4. Provide all supporting steel required for the installation of ductwork and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support.
5. For ground or equipment pad mounted support stand, use galvanized structural steel members and use duct rollers fastened to the structural member. Supports shall be secured to the ground or equipment pad.

E. Beam Clamps:

1. MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62 inch thick for single threaded rods of 3/8-, 1/2-, and 5/8-inch diameter. Furnish with a hardened steel cup point set screw. Acceptable manufacturer includes Anvil Figure 86.
2. MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1 1/2-inch diameter. Acceptable manufacturer includes Anvil Figure 228.

F. Corrosive Atmosphere Coatings:

1. Corrosive environments shall be as noted on the Drawings.
2. Ductwork in chemical rooms shall be supported with a plastic support system, Aickinstrut, or equal.

2.04 DUCT SEALANTS AND GASKETS

- A. Duct sealant shall be United McGill–United Duct Sealer, or equal for indoor applications and United McGill–Uni-Weather Duct Sealer, or equal for outdoor applications. Sealant shall be UL classified for flame and smoke development and shall be suitable for mating materials.
- B. Gaskets at flanged joints shall be butyl rubber or EPDM.

2.05 DUCTWORK FABRICATION

A. Rectangular Field and Shop Fabricated Ductwork:

1. Fabricate and support in accordance with SMACNA–Duct Construction Standards–Metal and Flexible. Duct material, gauges, reinforcing, joint types and sealing shall be in accordance with required pressure class in the standard.
2. Construct tees, bends, and elbows with radius of not less than 1 1/2 times width of duct on centerline. Where not possible, rectangular elbows may be used with turning vanes in accordance with Section 23 33 00–Air Duct Accessories.
3. Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible; maximum 30 degree divergence upstream of equipment and 45 degree convergence downstream.
4. Provide 45 degree expanded entry takeoffs unless otherwise indicated. Flange ductwork for attachment to grille registers and outlets, unless otherwise noted.
5. Provide reinforcement and rigidity required for pressure class.
6. Provide cross breaking or cross beading on duct sides larger than 18 inches.
7. Seal all joints airtight with gaskets and sealants.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards–Metal and Flexible.
- C. Duct sizes are inside clear dimensions.
- D. Provide openings in ductwork to accommodate testing equipment and controllers. Where openings are provided in insulated ductwork, install a metal insulation sleeve of same material as ductwork.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities. Make all necessary incidental changes in cross-section, offsets, etc., to avoid interference with other equipment and supports.
- F. Supports:
 - 1. Use double nuts and lock washers on threaded rod supports.
 - 2. Inserts shall be coordinated with general contractor for installation in concrete.
 - 3. The weight of the ductwork shall be supported independently of connected equipment.
 - 4. Secure ducts to supports with metal straps over ductwork and insulation and jacketing, if applicable.
- G. Connect air diffusers, registers, and grilles to supply and return ducts directly. Where registers and grilles are to be mounted on exposed ductwork, provide flanged opening for finished appearance.
- H. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- I. Provide an experienced installer to go through the air distribution system with the balancer.
- J. Any modifications to the ductwork shown on the Drawings must be reviewed by ENGINEER prior to installation.
- K. Where ducts pass through non-fire rated partitions in interior or exterior walls, provide stainless steel flange on four sides on both sides of partition concealing opening. Flange shall overlap opening all around by 2 inches. Fill space with insulation if duct is insulated on either side of partition.
- L. Where ducts pass through fire rated partitions in interior or exterior walls, install fire damper sleeve in accordance with manufacturer's recommendations.

3.02 CLEANING AND PROTECTION

- A. Clean air handling unit and ductwork prior to the installation of textile ductwork system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.

- B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Air Turning Devices.
 - 2. Duct Access Doors.
 - 3. Duct Test Holes.
 - 4. Fire Dampers.
 - 5. Flexible Duct Connections.
 - 6. Duct Screens.
 - 7. Balancing Dampers.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.
 - 2. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.
 - 3. UL 33—Heat Responsive Links for Fire-Protection Service.
 - 4. UL 555—Fire Dampers and Ceiling Dampers.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Damper submittals shall include actual pressure drop, free area, and torque requirements for each type of damper provided.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 77 00—Contract Closeout.
- B. Record actual locations of access doors, fire dampers, flexible duct connections, dampers, and screens.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in accordance with manufacturers recommendations and Section 01 60 00—Materials and Equipment.

1.06 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 AIR TURNING DEVICES

- A. Provide factory-fabricated metal air turning vanes in all square elbows and bends according to SMACNA Standards. Turning vanes shall be constructed of the same material specified for the ductwork.

2.02 DUCT ACCESS DOORS

- A. Provide Ductmate Model FD&H, or equal, access doors for ductwork. Access door hinge and cover shall be constructed of material similar to that specified for ductwork. Provide insulated access doors where ductwork is insulated. All access doors shall be gasketed.
- B. Provide Chicago Plastics Systems PVC gasketed duct access doors with hinges and plastic knobs in all PVC ductwork, or equal.

2.03 DUCT TEST HOLES

- A. Provide Ventfabrics, Inc. No. 699 Instrument Test Holes, or equal, complete with gaskets and screw caps. Coordinate test hole height with insulation thickness.
- B. On uninsulated ductwork only, plastic pull-tab centered tapered plugs may be used. Plugs shall be Caplugs CPT-3, or equal, with minimum diameter of 0.36 inch.

2.04 FIRE DAMPERS

- A. Provide fire dampers equal to Greenheck Model DFD-150, Type B or Type C, or Model DFD-350, of sizes and at locations as indicated on the Drawings. Dampers shall have a 1 1/2-hour fire rating unless indicated on the Drawings to have a 3-hour rating. Fire dampers shall meet NFPA 90A and shall be UL555 listed and labeled. Blades shall be located out of the airstream. Dampers shall be of stainless steel construction where indicated.

2.05 FLEXIBLE DUCT CONNECTIONS

- A. Flexible duct connections in unrated spaces shall be Ventfabrics, Inc. "Ventglas®", or equal, neoprene-coated glass fabric. Fabric shall be suitable for continuous operation up to 200°F. Fabric shall have zero leakage at ±10 inches water column.
- B. Flexible duct connections in rated spaces shall be Ventfabrics, Inc. "Ventel™", or equal, Teflon fluorocarbon resin-coated glass fabric. Fabric shall be suitable for continuous operation up to 500°F. Fabric shall have zero leakage at ±8 inches water column.

2.06 DUCT SCREENS

- A. Provide screens equal to Ryerson Ryex Standard, 3/4-inch, 12-gauge sheet metal with border frame for protection on open duct inlets and outlets, and as indicated on the Drawings. Frame and screen shall be of similar material to ductwork.
- B. In FRP ductwork, provide screen equal to Harrison Machine and Plastic, 3/4-inch with border frame for protection, in lieu of metal. Install screen at sufficient angle to provide 60% of duct-free area through screen.

2.07 BALANCING DAMPERS

- A. All balancing dampers shall be provided with locking devices to hold the dampers in a fixed position without vibration. Single blade dampers shall be stiffened to operate in a stable manner.
 - 1. Balancing dampers for rectangular metal ductwork 12 inches high or less and for round metal ductwork shall be single blade manual balancing dampers of same material as specified for the ductwork. Dampers shall conform to SMACNA standards for single blade-type volume dampers.
 - 2. Balancing dampers for rectangular ductwork over 12 inches high shall be Greenheck VCD-20, or equal, multi-blade volume dampers of same material as specified for the ductwork. Damper blades shall be 3V type of 16-gauge construction. Bushings shall be nylon. Axles shall be 1/2-inch diameter. Blade operation shall be opposed. Damper shall include an indicator to show position of the blades. Where dampers are installed in vertical ductwork, provide dampers with jamb seals designed for vertical duct installation.
- B. Dampers for PVC ductwork shall be Chicago Plastics Systems Blastgate or quadrant damper, or equal. Dampers shall be PVC with lockable blades for balancing.
- C. Dampers for FRP ductwork shall be Spunstrand ZL, or equal. Dampers shall be of FRP construction and designed for balancing applications.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards–Metal and Flexible. Refer to Section 23 31 00–Ductwork and Ductwork Supports for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after intake louver screens, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Duct access doors shall be provided every 10 feet on supply, return, and exhaust ductwork. Provide minimum 8-inch by 8-inch size for hand access, 18-inch by 18-inch size for shoulder access, and as indicated.
- C. Division 23 shall be responsible for coordinating with testing and balancing agency and providing test holes in all locations required for testing and balancing agency to complete their scope of work.
- D. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Metal-to-metal gap shall be approximately 4 inches.
- E. Provide fire dampers at locations indicated and where ducts and outlets pass through fire-rated components. Install with perimeter mounting angles, sleeves, breakaway duct connections, corrosion-resistant springs, bearings, bushings, and hinges.
- F. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts for air balancing and where indicated on the Drawings. Install minimum two duct widths from duct takeoff.
- G. Provide balancing dampers on duct takeoff to diffusers, grilles, and registers regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 34 16

CENTRIFUGAL HVAC FANS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Ceiling or Cabinet Fans.
 - 2. Centrifugal Inline Fans.
 - 3. Centrifugal Blowers.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. AMCA 99—Standards Handbook.
 - 2. AMCA 210—Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
 - 3. AMCA 300—Reverberant Room Method for Sound Testing of Fans.
 - 4. AMCA 301—Method for Calculating Fan Sound Ratings from Laboratory Test Data.
 - 5. ASTM B117—Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 6. NFPA 70—National Electrical Code.
 - 7. NEMA MG 1—Motors and Generators.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.
- C. Submittal shall include fan-specific performance curves showing airflow, head, and motor horsepower.
- D. Submit manufacturer's installation instructions and recommendations.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.
- F. Hanging and support requirements shall follow the recommendations in the manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Fans shall bear AMCA-certified rating seals.
- C. Electrical components shall be UL listed for the service specified.
- D. Electrical components and work shall be in accordance with the National Electrical Code.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements shall be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.
- F. Motors, shafts, and bearings shall be protected from weather and dust.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule, and activities.
- B. Include replacement and spare parts lists.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be

included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 CEILING FANS OR CABINET FANS

- A. Acceptable manufacturers are Greenheck, Cook, or Twin City Fans.
- B. Fans shall have acoustically insulated housings and shall have maximum sound level rating not to exceed 4.0 sones in accordance with AMCA Bulletin 300-74. Fans shall bear the AMCA-certified ratings and seal for air capacity, sound, and UL label.
- C. Unit shall be equipped with integral chatter proof backdraft damper.
- D. Fans shall have centrifugal wheel with inlet perpendicular to grille. Ceiling grille shall be aerodynamically designed and shall provide 80% free area.
- E. Terminal box shall be furnished with cord, plug, and receptacle inside housing. Entire fan, motor, and wheel assembly shall be removable without disturbing the housing. Motor speed shall not exceed 1,100 rpm.
- F. Fan shall be mounted on vibration isolators furnished by fan manufacturer.
- G. Manufacturer shall furnish line voltage internally-mounted and wired variable speed controller for fan. Controller shall be used for balancing only and shall be inaccessible to room occupants unless otherwise indicated on the Drawings. The fan motor shall be open drip proof as indicated on Drawings. Starters and disconnects shall be provided as noted on equipment schedules. Where indicated on equipment schedules, provide electronically commutated motor (ECM) capable of varying speed based on external 0 to 10 VDC control signal.

2.02 CENTRIFUGAL INLINE FANS

- A. Acceptable manufacturers are Greenheck, Cook, or Twin City Fans.
- B. Centrifugal inline fans shall be of drive type indicated on drawing schedules. Fan performance shall be as indicated on equipment schedules. Fans shall be UL listed.
- C. The fan wheel shall be centrifugal with backward-inclined blades. The fan wheel shall be statically and dynamically balanced.

- D. The fan shall be quiet-operating and vibration-free. Fan performance shall include AMCA-certified air and sound ratings and AMCA seal. Furnish and install spring-type vibration isolators provided by fan manufacturer.
- E. The fan shaft shall be mounted in prelubricated ball bearing pillow blocks. Bearings shall be sealed and have a minimum L₁₀ life of 100,000 hours.
- F. The fan housing shall be all aluminum construction with square inlet and discharge collars. Provide access panels for servicing drives and motors. All fasteners shall be either stainless steel or aluminum.
- G. Fans shall be mounted on vibration isolators furnished by fan manufacturer.
- H. Belt drives shall have a sliding or pivoting motor plate for belt tensioning. The belt and motor shall be totally enclosed by a guard with tachometer holes. The motor shall be mounted out of the airstream. The fan motor shall be as noted on the equipment schedule and NEMA-approved ball-bearing type. Starters and disconnects shall be provided as noted on equipment schedules. Motors shall be provided with a 1.15 service factor. Motors 1 hp and higher shall have a NEMA premium efficiency rating. Where indicated on drawing schedules, provide electronically commutated motor capable of varying speed based on external 0 to 10 VDC control signal. Motor operating on VFDs shall be inverter ready, meet the requirements of NEMA MG1, Part 31 for motor insulation, and be capable of a minimum speed turndown of 4:1. Provide shaft grounding split ring kit as manufactured by AEGIS, or equal, for motors operating on VFDs. Thermostats shall be applied to motor windings, capable of shutdown and manual reset (by Division 26).
- I. Each fan and motor combination shall be capable of delivering 110% of air quantity scheduled at scheduled static pressure. The motor furnished with the fan shall not operate into the motor service factor when operating under these conditions.
- J. Where schedules indicate fans are to be suitable for corrosive environments, all surfaces of the fan, screen, guards, etc. shall be coated with 2 to 3 mils of Hi-Pro Polyester powder coating. Wheel shall be rebalanced statically and dynamically by the fan manufacturer after application of the coatings. Color shall be selected by OWNER. Submit color chart with shop drawings.

2.03 CENTRIFUGAL BLOWERS

- A. Blowers, as shown on the Drawings, shall be manufactured Plastec Ventilation, or equal.
- B. Blower housing shall be single-piece, seamless, UV-resistant polypropylene. Split-molded housings are not acceptable. All supporting hardware shall be stainless steel.
- C. Blower wheel shall be constructed of polypropylene or 304L stainless steel and be forward-curved type. Blower wheel shall be statically and dynamically balanced. Blower wheel shall be provided with a motor shaft bushing and hubcap made of polypropylene.
- D. Blower motor shall be UL listed for continuous-duty. Motor shall be as noted on the equipment schedule, and provided with a motor junction box. Provide polypropylene or powdercoated aluminum motor stand. Starters and disconnects shall be provided as noted on equipment schedules. Motors 1 hp and higher shall have NEMA premium efficiency rating.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.
- C. Install units with vibration isolators as recommended or supplied by manufacturer.
- D. Provide flexible duct connections on all duct connections to unit in accordance with Section 23 33 00–Air Duct Accessories.
- E. Provide lubrication line extenders as required to allow regreasing of bearings without removal of equipment components.
- F. Provide all mounting hardware and accessories necessary for complete installation.
- G. Touch-up, repair or replace damaged products at no additional cost to OWNER.
- H. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.
- I. Drawings and Specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of Drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 37 08

LOUVERS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Louvers.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ADC 1062—Certification Rating and Test Manual.
 - 2. AMCA 500—Test Method for Louvers, Dampers, and Shutters.
 - 3. ARI 650—Air Outlets and Inlets.
 - 4. ASHRAE 70—Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
 - 5. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.

1.03 QUALITY ASSURANCE

- A. Performance of air terminals shall be in accordance with ADC 1062.
- B. Louvers shall be tested and certified in accordance with AMCA 500 and shall bear the AMCA seal.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include a louver schedule that includes louver model, screen type, screen location, louver size, finish type, free areas, face velocity, and pressure drop for each louver.
- C. Submit manufacturer's installation instructions and recommendations.
- D. Submit color selection chart with submittal for selection by OWNER.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage.

- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. Scratched, dented, and otherwise damaged units shall be repaired or replaced with no additional cost to OWNER.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 LOUVERS (EXTRUDED ALUMINUM)

- A. Acceptable louvers are Greenheck ESD 635, or equal. See Drawings for sizes and locations.
- B. Blades and frame shall be extruded aluminum 6063-T5 alloy and 0.08-inch thickness.
- C. Blades shall be 35-degree drainable type spaced at 4 inches on center. Louver shall be capable of a velocity of 1,077 fpm with no water penetration. Performance shall include AMCA-certified air and moisture penetration data and louver shall bear the AMCA seal. Vertical and horizontal mullions and connections between panels shall not be exposed.
- D. Provide channel frame unless noted otherwise on the Drawings.
- E. Provide aluminum screen on louver (type and location) in accordance with louver schedule and detail on the Drawings. All fastenings shall be stainless steel or aluminum. Screen frame shall be painted to match louver. Paint shall be by manufacturer or per Section 09 91 00—Painting.
- F. Louver free area shall be equal to or greater than attached ductwork and damper free area.

- G. Louvers shall be furnished with 3 coats of 70% Kynar 500 finish with custom color selected by OWNER. Submit manufacturer's standard color chart with shop drawings.

PART 3-EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify ENGINEER of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions, drawing details, and approved submittals.
- C. Clean surface of louvers and vents after installation.

END OF SECTION

SECTION 23 37 13

GRILLES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Grilles.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ADC 1062—Certification Rating and Test Manual.
 - 2. AMCA 500—Test Method for Louvers, Dampers, and Shutters.
 - 3. ARI 650—Air Outlets and Inlets.
 - 4. ASHRAE 70—Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
 - 5. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Performance of air terminals shall be in accordance with ADC 1062.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.
- C. Submittal shall include a schedule that includes model, size, and finish type.
- D. For product requiring color selection, provide a hard copy color chart to OWNER for color selection.
- E. CONTRACTOR shall provide all required sizes and quantities as shown on Drawings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 GRILLES

- A. Acceptable manufacturers are Carnes (C), Price (P), Nailor (N), or Titus (T). Submit standard color chart with shop drawings for selection by OWNER.
- B. SG-1: Stainless steel supply grilles for sidewall and surface mounting shall be (C) RLDB, (N) 67DH, (T) 300RL-SS, or (P) 720. Grilles shall be 304 stainless steel construction with double deflection blades.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals.
- C. Provide all mounting hardware and accessories necessary for complete installation.
- D. Clean surface of diffusers, grilles, and registers after installation.
- E. Drawings and Specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 51 00

BREECHINGS, CHIMNEYS, AND STACKS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Single Wall Special Gas Vent.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following reference.
 - 1. ASTM A167—Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 2. ASTM A525—Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
 - 3. ASTM A527—Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
 - 4. ASTM D1784—Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - 5. NFPA 54 (ANSI Z223.1)—The National Fuel Gas Code.
 - 6. NFPA 211—Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.
 - 7. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.
 - 8. UL 103—Standard for Factory Built Low Heat Chimneys.
 - 9. UL 441—Standard for Gas Vents.
 - 10. UL 641—Standard for Low Temperature Venting Systems.
 - 11. UL 959 (ANSI Z181.1)—Medium Heat Appliance Factory Built Chimneys.

1.03 QUALITY ASSURANCE

- A. Factory-built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Engineered generator exhaust systems shall be submitted with layout and section drawings by the manufacturer.

1.05 REGULATORY REQUIREMENTS

- A. Conform to NFPA 54 and local codes for installation of natural gas appliances and equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in accordance with manufacturers' recommendations and Section 01 60 00—Materials and Equipment.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2—PRODUCTS

2.01 GENERAL

- A. For each fuel-fired appliance, provide venting of category recommended by manufacturer.
- B. Size vents in accordance with manufacturer's recommendations.
- C. Where vents are routed through unconditioned spaces, insulate lengths of piping exceeding 1 1/2 feet of length per inch of diameter in accordance with Section 23 07 19—Piping Insulation for HVAC.

2.02 SINGLE WALL SPECIAL GAS VENT

- A. Acceptable manufacturers are DuraVent Duraseal; Metal-Fab Corr/Guard; or Z-Flex Z-Vent.
- B. Maximum rated continuous temperature shall be 550°F.
- C. Vent shall be listed for an internal static pressure of at least 8-inch w.g. and tested to at least 15-inch w.g.
- D. Material shall be corrosion resistant Type 316 stainless steel, AL29-4C, or superior as approved by ENGINEER. Gaskets shall be of Viton material.
- E. Vent connections shall be secured by lock tabs. Joints shall be sealed with factory installed gasket.
- F. All joints and seams shall be gas-tight. Vents shall be leak tested in accordance with UL 1738.
- G. Provide all necessary accessories including flashing, counter flashing, storm collar, insulated thimble, rain cap with bird screen, clean out, fittings and all necessary supports. Where roof pitch exceeds 12:12, provide roof curb.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install stack, breeching, and accessories in accordance with the manufacturer's recommendations, maintaining minimum clearances from combustibles specified in UL listing, NFPA 54, and local codes.
- B. Level and plumb chimney and stacks.
- C. Install breechings with as few joints as possible. Align connections accurately and maintain smooth internal surfaces. All joints of positively pressurized exhaust vents shall be leak tight.
- D. Clean breeching, chimneys, and stacks internally during and after installation to remove dust and debris. Clean external surfaces to remove welding slag and mill film.
- E. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
- F. Provide minimum 2-foot length of breeching to connect appliance to chimney.
- G. Insulate breechings in accordance with Section 23 07 13–Ductwork Insulation for Heating, Ventilation, and Air Conditioning.
- H. Pitch breechings with 1/4 inch per foot slope up from fuel-fired equipment to chimney or stack.
- I. At ends of breeching and chimneys which are not completed or connected to equipment, provide temporary closure which will prevent entrance of dust and debris until final connections are made.
- J. Support breechings from building structure, rigidly with suitable ties, braces, hangers, and anchors to hold to shape and prevent buckling. Support per manufacturer's recommendations and refer to SMACNA HVAC Duct Construction Standards–Metal and Flexible for equivalent duct support configuration and size. At minimum, support vertical sections at each floor penetration. Support from floor structure, roof structure, or adjacent structural surfaces. Verify load bearing capacity of support points with ENGINEER.
- K. Locate exhaust termination and combustion air intake in accordance with appliance manufacturer's recommendations to prevent re-entry of products of combustion.
- L. Termination of exhaust within 10 feet of operable windows, other building openings, or air intakes will not be accepted.
- M. Locate terminations with respect to normal wind direction so that the products of combustion are not likely to enter the building, regardless of the distance from the vent to the building openings or air intakes. Provide adequate termination height to avoid contamination of building recirculation zones in accordance with guidelines of ASHRAE Fundamentals.
- N. Seal all joints of positive pressure stacks and breeching in accordance with manufacturer's recommendations, using only sealants recommended by stack manufacturer.

- O. Provide drain points as indicated and per the manufacturer's recommendation to allow proper draining of condensate. Provide Flue Gas Condensate pH Neutralization at each drain piping termination point.

3.02 AIR INLETS AND VENT TERMINATIONS

- A. Coordinate air intakes with other vent terminations, plumbing vents, and HVAC exhaust openings.
- B. Terminations shall not be within 10 feet horizontally or less than 3 feet above openings for HVAC intakes or combustion air inlets.

END OF SECTION

SECTION 23 55 33

FUEL-FIRED UNIT HEATERS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Gas-fired Unit Heaters (GUH).
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASHRAE 103—Heating Seasonal Efficiency of Central Furnaces and Boilers, Methods of Testing.
 - 2. NFPA 54 (AGA Z223.1)—National Fuel Gas Code.
 - 3. NFPA 70—National Electrical Code.
 - 4. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.
 - 5. NFPA 90B—Installation of Warm Air Heating and Air Conditioning Systems.
 - 6. NFPA 211—Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.
 - 7. ASHRAE 90A—Energy Conservation in New Building Design.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New start-up shall be for the purpose of determining alignment, lubrication, voltage, amperage readings, and all proper electrical connections. A copy of the start-up report shall be made and sent to both CONTRACTOR and to ENGINEER.
- C. All gas-fired heating equipment shall be design-certified by the American Gas Association.
- D. All control panels shall be UL listed.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.

- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 00–Submittals. Included in submittals shall be detailed control wiring diagrams that show logic circuits for the unit, as well as all external connections (i.e., thermostats, SCADA, etc.)
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.
- C. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.
- D. Submit manufacturer's installation instructions.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.

1.06 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national

de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 GAS-FIRED UNIT HEATERS (GUH)

- A. Acceptable manufacturers are Modine, Sterling, or Reznor.
- B. The unit cabinet shall be constructed of 22 gauge galvanized steel with a baked-enamel finish.
- C. The unit fan shall have a propeller fan with a direct-drive motor and fan guard.
- D. The unit heat exchanger shall be an indirect-fired, power-vented heat exchanger constructed of 409 stainless steel.
- E. Unit shall have an indirect-fired burner with power venting constructed of 409 stainless steel. Burner shall be furnished with a solid-state intermittent-spark electronic ignition system with electronic flame supervision and stack damper. Unit heaters shall have an 80% thermal efficiency.
- F. Provide a gas train including 24-volt solenoid gas valve, main and pilot regulators, On-Off gas valve, transformer, high limit, stack damper, and fan On-Auto switch to operate fan without firing the burner.
- G. All burner and blower controls including motor starters shall be furnished by unit manufacturer and shall be factory-prewired. Equipment disconnect shall be provided by Division 26 contractor. Unit shall be equipped with controls for two-stage heating.
- H. Manufacturer shall furnish low-voltage thermostat. Thermostat shall be Honeywell Model Number CT53, or equal, with fan auto-on selector switch with room temperature setpoint adjustment. Control range shall be from 50°F to 90°F. Provide adaptor plate with thermostat for mounting to junction box.
- I. Provide two-way adjustable air deflector louvers.
- J. Mount units to provide 8 feet 0 inch clearance below, unless otherwise shown on the Drawings.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Provide vent connections in accordance with NFPA 211. Refer to Section 23 51 00–Breechings, Chimneys, and Stacks. Provide combustion air intake and vents in accordance with Drawings and manufacturer's recommendations.
- B. Drawings are based on the scheduled equipment make and model number. Any changes because of substitutions shall be provided and coordinated at no additional cost to OWNER.

- C. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.
- D. CONTRACTOR shall install the equipment and accessories in accordance with manufacturer's recommendations, NFPA 54, NFPA 90A, and as indicated on the Drawings. Provide connection to gas system.
- E. All equipment shall be installed plumb and level and anchored to structure.
- F. Proper access space around equipment shall be left for servicing the equipment. Follow manufacturer's recommendations for clearance and maintenance access requirements. Provide no less than a minimum of three feet, not including piping and piping appurtenances.
- G. Provide an adequate number of isolation valves for service and maintenance of the system and its components.
- H. Install the equipment under the direct supervision of an authorized representative of the manufacturer.
- I. All piping shall be brought to equipment connections in such a manner so as to prevent the possibility of any loads or stresses being applied to the connections or piping.
- J. All piping shall be fitted to equipment connections even though piping adjustments may be required after the pipe is installed.
- K. CONTRACTOR shall furnish the services of the equipment manufacturer's authorized representative to supervise prestart checkout, initial start-up, performance testing, and operator instruction. Time available shall be as required to properly start up.
- L. Any operational deficiencies noted in equipment start-up shall be promptly corrected.

END OF SECTION

SECTION 23 81 26

SPLIT-SYSTEM AIR CONDITIONERS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Split systems (SS).
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASHRAE 15—Safety Code for Mechanical Refrigeration.
 - 2. ASHRAE 62—Ventilation for Acceptable Indoor Air Quality.
 - 3. ASHRAE 90A—Energy Conservation in New Building Design.
 - 4. NFPA 70—National Electrical Code.
 - 5. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.
 - 6. UL900—Test Performance for Air Filter Units.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session.
- C. Electrical components shall be UL listed for the service specified.
- D. Electrical components and work shall be in accordance with the National Electrical Code.
- E. Insulation and insulation adhesive shall comply with NFPA 90A requirements for flame spread and smoke generation.
- F. Direct expansion coils shall be designed and tested in accordance with ASHRAE 15 Safety Code for Mechanical Refrigeration, latest edition.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's

performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

- C. Provide project-specific wiring diagrams for power, signal, and control.
- D. Submit manufacturer's installation instructions and recommendations.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.
- F. Hanging and support requirements shall follow the recommendations in the manufacturer's installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements shall be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 SPLIT SYSTEM (SS)

- A. Acceptable manufacturers are Sanyo, Mitsubishi, or Daikin.
- B. General:
1. Split system unit shall be an indoor wall-mounted or cassette-style ceiling-mounted (SS-15-03 only) evaporator/blower section and matching outdoor condensing section.
 2. Systems shall bear the ARI label showing that the system is ARI 210 or 240, and 270 Certified. Systems shall be listed by ETL Testing Laboratories and bear the ETL label. Matching systems shall meet or exceed the minimum Federally mandated Seasonal Energy Efficiency Rating (SEER) of 13, as certified by the ARI testing programs.
 3. Matching indoor and outdoor sections shall be connected by deoxidized, annealed refrigerant copper tubing, type "L" cleaned and capped. All systems shall have flared refrigeration connections on both indoor and outdoor sections.
 4. Systems indoor and outdoor sections shall be completely factory assembled and wired with a precharge of refrigerant. A single power source shall provide voltage to both the outdoor and indoor units. Electrical wire and connections to outdoor section and between indoor and outdoor sections shall be sized, installed and grounded by the installer in conformance with the National Electrical Code (NEC), local codes, as well as manufacturer's instructions.
 5. System shall be equipped with a microprocessor control system with wired thermostat controller that provides access to all system functions and transmits room conditions and programs to the indoor microprocessor every 3 minutes. System shall have the capability of continuous operation in the case of a damaged controller, utilizing a factory-installed integral manual switch in conjunction with the system microprocessor.
- C. Control: Split system air conditioners shall be controlled by wired controllers furnished by the manufacturer. The associated air-cooled condensing unit shall start and the fan shall cycle when room temperature rises above the thermostat setpoint. The fan and associated air-cooled condensing unit shall be off when the room temperature is below the setpoint.
- D. Outdoor Condensing Section:
1. Outdoor condensing section shall be factory assembled, wired, piped, and precharged with a start-up amount of R-32 refrigerant.
 2. Unit shall be constructed of G90 galvanized steel with corrosion-inhibiting, acrylic, baked-on enamel finish.
 3. Unit shall be furnished with a high-efficiency, rotary compressor with internal overload protection, mounted with vibration isolators to reduce noise and vibration.
 4. Condenser coil heat exchanger shall be constructed of nonferrous rifled copper tubing with enhanced aluminum slit fins mechanically bonded to the copper. A suction line accumulator, a coil temperature sensor, and cap tube metering device shall be factory

installed. The fins shall be covered with an anti-corrosion acrylic resin and hydrophilic film type E1 rated for up to 1000 hours salt spray. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating shall be between 2.0 to 3.0 microns.

5. Fan motor shall be direct drive with internal overload protection, permanent lubrication, with propeller-type fan, mounted for horizontal air discharge.
6. Brass valves with refrigeration flare connections and flare nuts and service ports shall be factory mounted prior to shipment for installation.
7. Low ambient outdoor section shall contain a printed circuit board, factory mounted and wired, to assist in control of low ambient operation. A factory-installed 20-watt crankcase heater shall provide additional compressor protection. Unit shall be factory provided with a high-pressure safety switch and internal thermal overload protector.

E. Indoor Evaporator Section:

1. Indoor section shall be wall-mounted or cassette-style ceiling-mounted (SS-15-03 only) type with single direction airflow, factory assembled and wired.
2. Unit shall contain an evaporator heat exchanger constructed of nonferrous, rifled copper tubing with enhanced aluminum slit fans, mechanically bonded to the copper.
3. A single centrifugal blower wheel, statically and dynamically balanced shall be attached to a single direct-drive PSC fan motor with overload protection, permanent lubrication, and multispeed capability.
4. Unit shall contain a printed circuit board with a control circuit fuse and microprocessor, factory mounted and wired, that receives and processes all commands and transmissions from the system wired controller. Indoor unit shall also contain an Operation Switch with visible lamps for operation, standby and timer functions, as well as a system test switch and manual ON/OFF switch.
5. Unit shall contain an air sensor thermistor, a coil-freeze safety thermistor to prevent freeze-up, a factory-installed condensate drain pump, drain pan, hose and fitting, and refrigeration line connections with flare nuts.
6. Indoor section shall be provided with factory assembled supply and return air grille with a motorized louver/flap on the supply air opening. The motorized louver/flap, controlled by the wired controller, shall provide automatic, full-oscillating supply airflow, as well as being capable of being placed in a set, stationary position.
7. Unit shall also contain adjustable horizontal air louvers to provide user defined directional airflow. Indoor unit will be furnished with an in-ceiling plenum which surrounds the evaporator coil section.
8. Unit shall be furnished with antimold, poly type washable air filters that can be removed without removing indoor unit casing. Indoor unit shall be powered by voltage from the matching outdoor unit.

PART 3-EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify ENGINEER of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.
- C. Pipe and trap condensate to grade in accordance with Section 22 13 16—Sanitary Waste and Vent Piping and as shown on Drawings.
- D. Protect installed products until completion of project.
- E. Touch-up, repair or replace damaged products at no additional cost to OWNER.
- F. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.
- G. Drawings and Specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

3.04 CLEANING

- A. Unit shall be cleaned and filters shall be cleaned prior to final acceptance by OWNER.

END OF SECTION

SECTION 23 82 16

AIR COILS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Electric Duct Heaters (EDH).
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ARI 410—Forced Circulation Air-Cooling and Air-Heating Coils.
 - 2. NFPA 70—National Electrical Code.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Electrical components shall be UL listed for the service specified.
- C. Electrical components and work shall be in accordance with the National Electrical Code.
- D. Coil performance shall be certified in accordance with ARI 410.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements shall be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.

- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ELECTRIC DUCT COILS (EDH)

- A. Acceptable manufacturer is Thermolec, or equal.
- B. Coil shall be size and capacity as listed in Drawings.
- C. Coils shall be of nickel chrome alloy and shall be insulated by floating ceramic bushings from the galvanized steel frame. Coil terminal pins shall be stainless steel insulated by nonrotating ceramic bushings. Control box shall be gasketed.
- D. Heaters shall be slip-in type as shown on the Drawings. Heaters shall be suitable for insertion into the duct through an opening on its side, and shall have a flange for securing it to the duct side. Mounting flanges shall be independent of the terminal box so as to allow installation without opening the box or drilling into it.

- E. All duct heaters shall be equipped with fail-safe, automatic reset and manual reset disc-type thermal cutouts.
- F. Cutouts shall be shielded from impact and shall deenergize the heater in case of insufficient air flows.
- G. Duct heaters shall be equipped with magnetic contactors, 24-volt transformer, airflow sensor, room thermostat/duct thermostat, SCR control, solid-state relays, and protective screens.
- H. Heater shall be equipped with a built-in disconnect to switch the power off at the heater location.
- I. Load fuses shall be supplied as required by local codes.
- J. Pilot lights shall be provided for power on (Green), and no air flow (Red).
- K. Heater control cabinet shall be equipped with door interlock to disconnect power to the unit while door is open.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.
- C. Provide all mounting hardware and accessories necessary for complete installation.
- D. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.
- E. Drawings and Specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 82 39

UNIT HEATERS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Electric Unit Heaters.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ARI 410—Forced Circulation Air-Cooling and Air-Heating Coils.
 - 2. NFPA 70—National Electrical Code.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the Drawings.
- B. Electrical components shall be UL listed for the service specified.
- C. Electrical components and work shall be in accordance with the National Electrical Code.
- D. Coil performance shall be certified in accordance with ARI 410.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.

- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ELECTRIC UNIT HEATERS

- A. CONTRACTOR shall provide electric heaters of the type, size, capacity, and accessories as listed on the equipment schedule. All units shall be UL listed.
- B. All electric unit heaters shall be factory-assembled and tested.
- C. Electric Unit Heaters (Corrosion-Resistant) (EUH):
 - 1. Acceptable manufacturers are:
 - a. QMark Model QWD.
 - b. Berko Model BWD.
 - c. Chromalox Model HD3D.
 - d. INDEECO Model TRIAD.

2. The cabinet shall be constructed of heavy gauge stainless steel with stainless steel adjustable air deflectors and stainless steel wall-mounting bracket. Heating elements shall be 316 stainless steel sheathed with 316 stainless steel fins.
 3. Unit shall include a direct-drive totally enclosed epoxy coated motor, wired to a NEMA 4X enclosure.
 4. Unit shall include an automatic reset thermal cutout to protect the element and a thermal fan delay.
 5. Unit control voltage shall be 120 V. Line voltage (120 V) thermostat shall be provided by Division 26.
 6. Unit-mounted equipment disconnect shall be ABB OT Series provided by manufacturer suitable for corrosive locations and meet the requirements of Division 26.
 7. Mount bottom of units 8 feet 0 inch above finished floor, unless otherwise shown on Drawings.
- D. Electric Wall Heaters (EWH):
1. Acceptable manufacturer is QMark, or equal.
 2. Furnish and install a steel cabinet for recessed mounting in standard 2 by 4 stud wall or surface mounting on a standard block wall as shown on Drawings. Provide a cabinet with 16 gauge steel grille bars and finished in baked enamel.
 3. Provide a direct-drive propeller fan and permanently lubricated totally enclosed motor.
 4. Provide steel-finned metal sheath electric heating elements.
 5. Provide manual reset thermal overheat protection to disconnect power in the event of overheating. Provide an integral, tamper-resistant thermostat. Provide integral contactors and disconnects.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.
- C. Provide all mounting hardware and accessories necessary for complete installation.
- D. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.

- E. Drawings and Specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 84 16

MECHANICAL DEHUMIDIFICATION UNITS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: High-efficiency Dehumidification Equipment.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references.
 - 1. ASHRAE 62—Ventilation for Acceptable Indoor Air Quality.
 - 2. ASHRAE 84-87P—Method of Testing Air-to-Air Heat/Energy Exchangers.
 - 3. ARI 1060—Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery.
 - 4. NFPA 70—National Electrical Code.
 - 5. NFPA 90A—Installation of Air Conditioning and Ventilating Systems.

1.03 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.
- B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session.
- C. Manufacturer Qualifications: Minimum 5 years of experience manufacturing similar products.
- D. Installer Qualifications: Minimum 2 years of experience installing similar products.
- E. Electrical components shall be UL listed for the service specified.
- F. Electrical components and work shall be in accordance with the National Electrical Code.
- G. Insulation and insulation adhesive shall comply with NFPA 90A requirements for flame spread and smoke generation.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00—Submittals.
- B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's

performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

- C. Provide project-specific wiring diagrams for power, signal and control.
- D. Submit manufacturer's installation instructions and recommendations.
- E. Submittals must be specific to this project. Generic submittals will not be accepted.
- F. Hanging and support requirements shall follow the recommendations in the manufacturer's installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.
- B. Materials that could be damaged by the elements shall be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- C. Store materials in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Use all means necessary to protect equipment before, during, and after installation.
- E. All scratched, dented, and otherwise damaged units shall be repaired or replaced at no additional cost to OWNER.

1.06 OPERATION AND MAINTENANCE DATA

- A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.
- B. Include replacement and spare parts lists.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be

included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 HIGH-EFFICIENCY DEHUMIDIFICATION EQUIPMENT

- A. Provide dehumidification equipment that meets the requirements listed below and on equipment schedule. Acceptable manufacturer is Hi-E Dry, or equal. Equipment schedule is located on the drawings.
- B. Provide a high-efficiency dehumidifier that utilizes refrigeration to cool the incoming air stream below its dewpoint as it passes through the dehumidification (evaporator) coil. Cooled and dried air shall be used to precool the incoming air stream to result in a 200% to 300% increase in overall efficiency.
- C. The unit shall be controlled by an integral dehumidistat with settings from 20% to 80% relative humidity, and a positive “on” and “off” setting.
- D. The unit shall contain a blower switch that shall permit continuous blower operation independent of dehumidification.
- E. The unit shall be portable and provided with four casters.
- F. The unit shall contain an internal condensate pump capable of lifting condensate 12 feet, and 20 feet of condensate hose.
- G. Wiring of the unit shall be through a factory-installed 6-foot power cord with NEMA 5-15 three-prong plug; 115-volt with ground.

PART 3—EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify ENGINEER of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
- B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.
- C. Protect installed products until completion of project.
- D. Touch-up, repair or replace damaged products at no additional cost to OWNER.
- E. Route condensate drainage from unit to grade or as noted on the drawings.
- F. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes general requirements for all electrical work.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this section.

1.02 REFERENCES

- A. ANSI/NFPA 70—National Electrical Code (NEC).
- B. ANSI/IEEE C2—National Electrical Safety Code.

1.03 CONTRACT DOCUMENTS

- A. Any equipment roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to OWNER.
- B. The Drawings are generally diagrammatic, and CONTRACTOR shall coordinate the Work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.
- C. Hazardous or classified locations, where referenced in the Specifications or on the Drawings, shall be as defined in the NEC.

1.04 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 70.
- B. Conform to ANSI/IEEE C2.
- C. The rules and regulations of the federal, state, local, and civil authorities and utility companies in force at the time of execution of the Contract shall become a part of this specification.
- D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be paid by CONTRACTOR.

1.05 CODES AND ORDINANCES

- A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and

interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

- B. In preparing a Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the Drawings and Specifications. All cases of apparent conflicts between the Drawings, Specifications, and codes shall be brought to ENGINEER's attention, as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.
- C. When requested by ENGINEER, CONTRACTOR shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, handhole sizing, conductor derating, and voltage drop. CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, drawing, or specification.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

- A. Included in this Contract are electrical connections to equipment provided under other divisions. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other divisions, for exact location of electrical equipment, and the various connections required.

1.07 ELECTRICAL DISTRIBUTION SYSTEM

- A. Provide a complete electrical distribution system consisting of components indicated on the Drawings or specified herein including, but not limited to:
 - 1. All miscellaneous equipment coordination and related appurtenances required by power company.
 - 2. 480-volt, three-phase, 4-wire service entrance conductors.
 - 3. 120/240-volt, single-phase, 3-wire service entrance conductors.
 - 4. Feeders, branch wiring, and electrical distribution equipment.
 - 5. All control wiring.
 - 6. Access panels and access doors for access to equipment installed by Division 26.
 - 7. Wiring between system components if equipment is not prewired.
 - 8. Lighting fixtures, lighting controls, and associated wiring.
 - 9. Support system design and supports for electrical raceways.
 - 10. Code-required disconnects.
- B. Provide a standby power system consisting of components indicated on the Drawings (see Section 26 32 13.1–East Receiving Station Standby Power System, Section 26 32 13.2–West Receiving Station Standby Power System, Section 26 36 24.1–East Receiving Station Service Entrance-Rated Automatic Transfer Switches, and Section 26 36 24.2–West Receiving Station Service Entrance-Rated Automatic Transfer Switches).
- C. CONTRACTOR shall connect all equipment furnished by other Divisions consisting of components indicated on the Drawings or specified herein.
- D. Provide balancing and adjusting of electrical loads.

- E. CONTRACTOR shall instruct OWNER's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.
- F. Provide miscellaneous items for a complete and functioning system as indicated on the Drawings and specified herein.
- G. A partial list of work not included in Division 26 is as follows: Painting (except as otherwise specified herein).

1.08 NOISE

- A. Eliminate any abnormal noises that are not considered by ENGINEER to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

1.09 DRAWINGS

- A. The Drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.
- B. Prior to locating equipment, confer with ENGINEER as to desired location in the various areas. In no case should equipment locations be determined by scaling drawings. Relocate equipment and bear cost of redoing work or other trades' work necessitated by failure to comply with this requirement.
- C. In certain instances, receptacles, switches, light fixtures, or other electrical devices and equipment, etc., may be relocated. Where relocation is within 10 feet of location shown on the Drawings, and when CONTRACTOR is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at CONTRACTOR's expense.
- D. The Drawings are schematic in nature and are not intended to show exact locations of conduit, but rather to indicate distribution, circuitry, and control.
- E. Where locations of future structures are shown on the Drawings, CONTRACTOR shall not route any conduit or install any materials or equipment within 30 feet of the boundaries shown.

1.10 EXISTING UNDERGROUND UTILITIES

- A. Record drawings of existing underground utilities are not available for this facility. CONTRACTOR shall excavate and verify the location of all underground utilities prior to installing new electrical equipment and prior to making modifications to existing electrical. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. CONTRACTOR shall temporarily relocate existing underground utilities to keep the existing facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

1.11 SUBMITTALS

- A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning work, shop drawings on the equipment and materials proposed to be furnished and installed. See Section 01 33 00–Submittals for requirements.
- B. CONTRACTOR shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by ENGINEER for purposes of clarification of CONTRACTOR's intent. CONTRACTOR shall also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under this section shall include, but not be limited to, the following, where applicable to this project:
 - 1. Electrical interconnection wiring diagrams; see Section 26 09 00–Controls and Instrumentation and Section 26 24 19–Motor Control.
 - 2. Major feeder routing in plan and elevation, including service entrance raceways and cable.
 - 3. Equipment room layouts showing exact locations and arrangements of equipment, conduit, wiring, etc., and clearances.
- C. These drawings and diagrams shall show applicable electrical switch and breaker sizes as well as the manufacturer's name and catalog number for each piece of equipment used.
- D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
 - 1. Proper sizes and capacities.
 - 2. That the item will fit in the available space in the manner that will allow proper service.
 - 3. Construction materials and finishes.
- E. When the manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. The shop drawings shall be clearly marked and noted accordingly.
- F. When equipment and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.
- G. See additional requirements of shop drawings under Division 01–General Requirements.

1.12 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national

de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 STANDARD PRODUCTS

- A. All equipment and products shall be of new manufacture per applicable specifications.
- B. All equipment shall be UL and NEMA approved.
- C. Unless specified otherwise, major distribution equipment such as panelboards, switchboards, VFDs, SPD, transformers, etc., shall each be by the same manufacturer.
- D. All equipment and wiring shall be selected and installed for conditions in which it will perform (e.g., general purpose, weatherproof, raintight, dustproof, or any other special type).

2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

- A. While it is not the intention of OWNER to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. CONTRACTOR shall submit with each request for approval of substitute material or equipment sufficient data to show conclusively that it is equivalent to that specified in the following respects:
 - 1. Performance:
 - a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
 - b. Energy consumption at the point of rating shall not exceed that of the specified equipment.
 - c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.
 - 2. Materials of construction.
 - 3. Gauges, weights, and sizes of all portions and component parts.
 - 4. Design arrangements, methods of construction, and workmanship.
 - 5. Coatings, finishes, and durability of wearing parts.
 - 6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
 - 7. Availability of prompt, reliable, and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.
- B. Requests for substitution shall include CONTRACTOR's reason for the request.
- C. If ENGINEER does not consider the items equivalent to those specified, CONTRACTOR shall provide those specified.
- D. See General Conditions for additional requirements.

2.03 LOW-VOLTAGE WIRING (LESS THAN 100 VOLTS)

- A. Low-voltage wiring specified in this section shall be applicable to all systems installed that utilize low-voltage wiring where such wiring is not specified in other technical sections.
- B. All wiring shall have copper conductors with 300-volt insulation rating and meet the requirements of NEC Article 725.
- C. All conductors must be suitable for the application intended. Conductors 16 AWG and larger shall be stranded. Conductors 18 AWG and smaller may be solid or stranded.
- D. Control Cable for Class 1 Remote Control and Signal Circuits: Individual conductors twisted together, shielded, and covered with an overall PVC jacket. Cable shall be UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the National Electrical Code.
- E. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the NEC Article 725.

PART 3-EXECUTION

3.01 UTILITY SERVICES

- A. Utility connection requirements shall be determined. All costs for coordinating utility service shall be included in the price bid as described in Section 26 21 00-Electrical and Internet Service System of these specifications.
- B. All costs for temporary service, temporary routing of piping, or any other requirements of a temporary nature associated with the utility service shall be included in the Base Bid.
- C. It is the intent that in the latter stages of construction, the permanent electrical service will be used and the temporary construction service discontinued. The following requirements shall govern the use of the permanent services:
 - 1. No permanent service shall be available until structure is enclosed, watertight, and heated.
 - 2. Only permanently connected and protected circuits and outlets shall be available.
 - 3. Temporary wiring shall not be connected to permanent distribution equipment.
 - 4. Under the above conditions, the use of permanent service equipment shall in no way affect the Contract conditions of the guarantee.
- D. It shall be CONTRACTOR's responsibility to police this situation and protect its equipment.

3.02 CONTINUITY OF SERVICE

- A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.
- B. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.

- C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.03 CLEANUP AND REMOVAL OF RUBBISH

- A. All lighting and appliance panelboards, switchboards, VFD enclosures, disconnect switch enclosures, junction boxes, and pullboxes shall be cleaned of debris and wires neatly arranged with surplus length cut off before installation of covers.
- B. Where louvers are provided in transformer enclosures, louvers shall be vacuumed free of all dust and dirt. Where air filters are provided in equipment such as control panels, VFD enclosures, transformers, CONTRACTOR shall replace all filters with new at the time of final completion.
- C. All lighting fixture lenses (interior and exterior fixtures) shall be cleaned at the time of installation, and all lens exteriors shall be cleaned just prior to final inspection.
- D. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.04 CONCRETE WORK

- A. All cast-in-place concrete for new electrical equipment bases shown on the Drawings shall be provided by CONTRACTOR, except where specifically noted to be provided by others. All new equipment shall be set on 3 1/2-inch minimum leveling slabs including freestanding enclosures, switchboard, etc. Pads shall be 3 inches larger than equipment being supported.
- B. Concrete shall comply with Section 03 30 00—Cast-In-Place Concrete.
- C. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.05 PAINTING

- A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.
- B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.
- C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR.
- D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.06 CAULKING

- A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

- B. Caulking sealant shall be silicone construction sealant as manufactured by General Electric or two-part polysulfide conforming to the requirements and bearing the seal of the Thiokol Chemical Corporation.
- C. Caulking sealant shall contain no acid or ingredients that will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

3.07 BUILDING ACCESS

- A. CONTRACTOR shall arrange for the necessary openings in the building to allow for admittance of all apparatus.
- B. When the installation requires openings and access through existing construction and the openings are not provided, CONTRACTOR shall provide the necessary openings.

3.08 COORDINATION

- A. Provide wiring for all motors and all electrically powered or electrically controlled equipment.
- B. All starters, VFDs, disconnects, relays, wire, conduit, push buttons, pilot lights, and other devices for the power and control of motors or electrical equipment shall be provided by CONTRACTOR except as specifically noted elsewhere in these specifications or on the Drawings.
- C. Where starters, VFDs, or other devices are provided by others, they shall be connected and wired by CONTRACTOR.
- D. CONTRACTOR's drawings and specifications shall show number and horsepower rating of all motors furnished, together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment after the Contract is awarded, any additional costs because of these changes shall be the responsibility of CONTRACTOR.
- E. All motors shall be provided for starting in accordance with local utility requirements and shall be compatible with starters or VFDs as specified herein or under the various trades' sections of these specifications.
- F. CONTRACTOR shall provide all line voltage power and control wiring (100 volts and above), including temperature control wiring for operation, control, and supervision of all motorized equipment, including wiring between VFDs and control devices as specified herein and as shown on the Drawings. Low-voltage control wiring (below 100 volts) shall be provided by CONTRACTOR supplying the equipment that has low-voltage wiring, unless otherwise noted. CONTRACTOR shall provide raceways for all low-voltage wiring.
- G. CONTRACTOR shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.
- H. Motors 1/2 hp and larger shall be NEMA rated 460 volts, three-phase, 60 Hz, unless otherwise shown. Motors 1/3 hp and below shall be 115 volts, single-phase, 60 Hz, unless otherwise shown.

3.09 EXCAVATION AND BACKFILL

- A. Backfilling of all trenches beneath concrete floor slabs within building shall be accomplished with gravel fill and shall be specially compacted to same density as surrounding area. Backfill of exterior trenches shall be compacted granular fill, unless otherwise noted. Compaction shall meet the requirements of Section 31 23 00–Excavation, Fill, Backfill, and Grading. Refer to Section 26 05 33–Conduit for additional requirements associated with PVC conduit installed in earth.
- B. Lines passing under foundation walls shall have a minimum of 1 1/2-inch clearance.
- C. Care shall be taken so that there is no disturbance of bearing soil under foundations.
- D. CONTRACTOR shall follow underground pipe runs where possible to avoid additional rock excavation. See Division 31 for rock excavation requirements.

3.10 EQUIPMENT ACCESS AND LOCATION

- A. CONTRACTOR shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment not just that installed under this division. Any components for the electrical systems that are installed without regard to the above shall be removed and relocated as required to provide adequate access at CONTRACTOR's expense.
- B. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim to fit the various types of ceiling, wall, or floor finishes. Provide materials that will fit properly the types of finishes actually installed.
- C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by CONTRACTOR at no additional cost.
- D. Electrical equipment, devices, instruments, hardware, etc., shall be installed with ample space allowed for removal, repair, calibration or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment that is to be installed or that is already in place.
- E. Locate electrical outlets and equipment to fit the details, panels, decorating, or finish of the space. ENGINEER shall reserve the right to make minor position changes of the outlets before the work has been installed. Verify door swings before installing room lighting switch boxes, and install boxes on the latch side of door unless noted otherwise.

3.11 WORKMANSHIP

- A. All work shall be performed in compliance with the NEC.
- B. Install work using procedures defined in NECA Standard of Installation.
- C. Location of process equipment as shown on the Drawings is approximate.

- D. Utilization equipment and control devices required under these specifications shall be mounted in a code-approved manner.
- E. Locations of utilization equipment and control devices as shown on the Drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance shall be performed at no additional cost to OWNER.
- F. Unless otherwise noted, conduit shall be fastened to building structure or equipment framework and not placed on the floor.
- G. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.
- H. Materials and equipment of the types for which there are National Board of Fire Underwriters Laboratories (UL) listings shall be so labeled and shall be used by CONTRACTOR.

3.12 AREA CLASSIFICATION

- A. As noted on the Drawings.
- B. Where referenced herein, damp and wet locations shall include, but not be limited to, all NEMA 4X areas, structures and areas below grade, and exterior locations.

END OF SECTION

SECTION 26 05 19

WIRE

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Wire.
 - 2. Wiring Connections and Terminations.
 - 3. Terminal Blocks and Accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical material, which has been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.03 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01 33 00—Submittals.
- B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.
- C. Submit manufacturer's instructions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Provide factory-wrapped, waterproof, flexible-barrier material for covering wire on wood reels, where applicable, and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, lamps, fuses, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

- B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 WIRE

- A. All wire for permanent installation shall be new stranded copper delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted. The use of multiconductor cable is not allowed.
- B. Motor circuit branch wiring and associated control wiring:
 - 1. Insulation type shall be THHN (indoors, nonVFD application).
 - 2. Minimum size for motor control wiring shall be 14 AWG.
 - 3. Control wiring for supervisory equipment shall be shielded, sized per equipment manufacturer's recommendations, or as shown on Drawings.
- C. All power wiring to motors utilizing Variable Frequency Drives (VFDs) shall be type XHHW-2.
- D. All wiring within control panels and SCADA panels that does not extend outside of the enclosure shall be insulation-type MTW, minimum size 16 AWG.
- E. Wiring in dry locations shall be THHN. Wiring in damp and wet locations shall be XHHW-2.
- F. Refer to Section 26 05 53—Electrical Identification for required wire insulation color coding and conductor labeling requirements. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.
- G. Branch circuit wiring for emergency lights and exterior lights in excess of 75 feet shall be minimum 10 AWG. Circuits 150 feet or over shall be sized for a maximum 2% voltage drop.

2.02 WIRING CONNECTIONS AND TERMINATIONS

- A. Provide crimp type UL or ETL listed terminations for 6 AWG and smaller stranded conductor connections to electrical devices and equipment such as receptacles, switches, and terminal strips. Crimp devices shall be Sta-kon, or equal.
- B. Provide insulated, silicone-filled spring wire connectors with plastic caps for 8 AWG conductors and smaller. Connectors shall be King Silicone-Filled Safety Connectors, or equal. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes. Spring wire connectors are not allowed for terminating motor conductors.
- C. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of one-hole copper compression lugs for 6 AWG and larger, split-bolt connector for 8 AWG and smaller, and motor-lead pigtail splice kit. Individual components shall be as follows:
 - 1. Split-bolt connectors shall be for use with copper conductors only.
 - 2. One-hole copper compression lugs shall be as manufactured by 3M, or equal, 30000 series. Lug size shall be selected based on motor and feeder wire sizes installed.
 - 3. Pigtail splice kit shall consist of one-hole lug cover, silicone grease, and mastic sealing strip. Pigtail splice kit shall have locking pins for conductors 2 AWG and larger. Kit shall be as manufactured by 3M, or equal, 5300 series, and be selected based on motor, feeder, and lug sizes installed.
- D. No splices will be allowed unless reviewed by ENGINEER. Where allowed, provide in-line splices for all conductor connections, 6 AWG and larger. Splice compression connectors for installation above grade shall be UL listed in-line copper barrel-type as manufactured by Burndy Type YS-TC, or equal, with heat shrink tubing to match the conductor size. Splice compression connectors for installation below grade shall be UL listed in-line copper barrel-type as manufactured by Burndy Type YS, or equal, with heat shrink tubing to match the conductor size. Splice compression shall be made with a manufacturer-recommended crimp tool.
- E. Above-ground reducing adapters shall be UL listed in-line copper barrel reducers as manufactured by Burndy Type YSR-TC, or equal, with heat shrink tubing to match the conductor size.
- F. Heat shrink tubing for splices and reducing adapters shall be UL listed, heavy wall type as manufactured by Burndy Type HS-H-PF, or equal, to match the conductor size.

2.03 TERMINAL BLOCKS AND ACCESSORIES

- A. Terminal Blocks: ANSI/NEMA ICS 4: UL listed or UL recognized under UL 467, UL 486E, UL1059, and UL 1953 (power terminals only).
- B. Power Terminal Blocks: Unit construction type, closed-back type, with tubular pressure screw connectors, rated 600 volts as manufactured by Allen-Bradley 1492-PDL, or equal.
- C. 600-Volt Fuse Holders: Fuse holders for circuits rated up to 30 amps and 600 volts AC shall be finger safe, UL Listed, DIN-rail mountable, and shall include blown-fuse indicating lights. Fuse holders shall be as manufactured by Allen-Bradley Bulletin 1492-FB, or equal.

- D. Signal and Control Terminal Blocks:
1. General-Purpose Terminal Blocks:
 - a. Terminal blocks shall be rated up to 600 volts AC/DC.
 - b. Terminal blocks shall accept center-mounted jumper bars without increasing the installed space.
 - c. Terminal blocks shall be Allen-Bradley Bulletin 1492-J, or equal.
 - d. Terminal block color shall be gray.
 2. Grounding Terminal Blocks:
 - a. Terminal blocks shall be Allen-Bradley Bulletin 1492-JG, or equal.
 - b. Terminal block color shall be green/yellow.
 3. Disconnect-type Terminal Blocks (300-Volt Class):
 - a. Terminal blocks shall be feed-through type with a knife-blade disconnect.
 - b. Terminal blocks shall be Allen-Bradley Bulletin 1492-JKD, or equal, depending on the application.
 - c. Terminal block color shall be gray.
 4. Fuse-type Terminal Blocks with Indicator (300-Volt Class):
 - a. Terminal blocks for applications from 100 to 300 volts AC shall be Allen-Bradley Bulletin 1492-H4, or equal, with neon blown-fuse indicator.
 - b. Terminal blocks for applications from 10 to 50 volts AC/DC shall be Allen-Bradley Bulletin 1492-H5, or equal, with LED blown-fuse indicator.
 - c. Terminal block color shall be black.
 5. Terminal Blocks for Power Meters and Current Transformers: Provide test-disconnect terminal blocks for disconnecting, shorting, and testing current transformers and for disconnecting and testing voltage sensing inputs. Provide test-disconnect terminals for individual current transformer or voltage sensing installations, and provide a group of terminals for all current transformer and voltage sensing inputs for each power meter installation.
 - a. Provide a pair of terminal blocks for each current transformer including one feed-through terminal block, one sliding disconnect terminal block with a cross-connection short-circuit slider. The pair of terminal blocks shall include the following:
 - (1) Feed-through terminal block shall be Weidmüller Model WTD 6/1 EN, or equal.
 - (2) Sliding disconnect terminal block shall be Weidmüller Model WTL 6/1 EN, or equal.
 - (3) Short-circuit slider shall be Weidmüller Model WKS 2/2, or equal. The short-circuit slider shall cover the terminal block conductor screws on the meter-side of the terminal blocks when in the non-shorting position, and expose the terminal block conductor screws when slid into the shorting position.
 - (4) Provide two cross-connection sliders Weidmüller Model STB, or equal, with connecting sleeves Weidmüller Model VH, or equal. Provide one slider fixing screw Weidmüller Model BS, or equal. Connecting sleeves and fixing screws shall be color coded for each current transformer.
 - b. Provide disconnecting terminal blocks for each voltage sensing and neutral connection. The terminal blocks shall include the following:
 - (1) Sliding disconnect terminal block shall be Weidmüller Model WTL 6/1 EN, or equal.
 - (2) Provide one cross-connection slider Weidmüller Model STB, or equal, with connecting sleeve Weidmüller Model VH, or equal, for each voltage sensing and neutral connection terminal block. Provide one slider fixing screw Weidmüller Model BS, or equal. The neutral connecting sleeve shall be a different color than the voltage sensing connecting sleeves.

- c. Terminal block colors shall be gray. Provide end plates and end brackets as required to complete the test-disconnect terminal block assembly.
 - 6. Terminal blocks shall have self-locking screw compression clamps rated for the size of conductors being terminated and upstream overcurrent protection for each application.
 - 7. The same manufacturer and style of terminal block shall be used throughout the entire project for all applications.
 - 8. Terminal blocks shall have tin-plated copper current bars and tin-plated steel screws. Terminal housings shall be completely finger safe from all live circuits and be constructed of self-extinguishing material with minimum UL 94-V0 flammability rating.
 - 9. Terminal blocks shall accept pre-printed, snap-in labeling cards on both sides without increasing the installed space. Provide terminal block manufacturer's end barriers and screw-type retainers for all terminal block groupings.
 - 10. Terminal blocks shall mount on standard DIN rail and shall be able to be removed without removing adjacent terminal blocks.
 - 11. Multi-level terminal blocks and stacked, single-level terminal block installations are not acceptable.
- E. Refer to Section 26 05 53—Electrical Identification for terminal block labeling requirements.

PART 3—EXECUTION

3.01 GENERAL WIRING METHODS

- A. Install electrical wire and connectors in accordance with the manufacturer's written instructions, applicable requirements of the NEC, the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices so that products serve the intended functions. Use appropriate wiring methods and materials for the equipment or environment.
- B. Stranded conductors shall be terminated using crimp-type devices specified herein. Conductors may not be wrapped around a terminal screw.
- C. Place an equal number of conductors for each phase of a circuit in the same raceway.
- D. Torque conductor connections and terminations with calibrated torque wrench to manufacturer's recommended values. Provide permanent marking on lug, bolt, nut, or connection for conductors larger than 4 AWG.
- E. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, panelboards, control panels, equipment, etc. Avoid splices between terminals of interconnecting power and control wiring.
- F. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g., panelboards, disconnects, etc.), and control panels shall not have any spring-wire connectors installed; all terminations shall be on terminal strips.
- G. Neatly train, lace, and tie wrap all wiring inside boxes, equipment, control panels, and panelboards.
- H. Make conductor lengths for parallel circuits equal.

- I. The same color shall be used for each numbered wire throughout its entire length.
- J. Terminate all wiring on terminal blocks in control panels, VFD enclosures, starter cubicles, and similar equipment. This shall include all spare or unused wires.
- K. Provide a dedicated neutral for each branch circuit or feeder requiring a neutral. Ampacity of neutral conductor shall match that of the branch circuit or feeder.
- L. Do not use a pulling means that can damage the raceway.
- M. Signal wiring (below 100 volts) must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, loop-powered devices, data communications, and communication wiring (i.e., Ethernet, serial, etc.). Analog wiring shall be in a conduit separate from all other wiring.
- N. Control wiring (e.g., internal thermal overloads, lockout stops, etc.) to motors utilizing VFDs shall be in a conduit separate from motor power wiring.
- O. Provide junction or pull boxes to facilitate the “pulling in” of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.
- P. Thoroughly clean wires before installing lugs and connectors.
- Q. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.
- R. Terminate spare conductors within equipment, control panels, etc., on terminal strips and label as “SPARE.” Spare wiring in pull or junction boxes may be terminated with electrical tape and labeled as “SPARE.” All spare conductor labels shall indicate where the conductors terminate. Refer to Section 26 05 53–Electrical Identification, for additional requirements.
- S. Feeder connections to motors shall be installed within the motor junction box utilizing factory engineered kits as specified herein. Spring wire connectors are not allowed for connections to motors.

3.02 GENERAL LOW-VOLTAGE WIRING METHODS (LESS THAN 100 VOLTS)

- A. Low-voltage wiring installation requirements specified herein shall be applicable to all systems installed that utilize low-voltage wiring where such wiring installation is not specified in other technical sections.
- B. Low-voltage wiring shall be installed in conduit.
- C. Control wiring for HVAC and lighting equipment connected to standby power shall be installed in conduit.
- D. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts. All sizes subject to NEC 725 requirements.
- E. Low-voltage cable splices shall only be allowed in junction boxes.

3.03 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Wax-based pulling lubricant is not allowed unless it includes a Teflon additive.
- B. Install wire in raceway after interior of building is enclosed, watertight, and dry, and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Conductors No. 6 AWG and larger shall be pulled into conduits by hand or by utilizing a tugger with built-in tension meter. Other motorized machines of any type are not allowed for any wire pulling. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling tension.
- E. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.
- F. CONTRACTOR shall observe code limitation on the number and size of wires in an outlet box. CONTRACTOR shall either lay out work so that the wires do not exceed the particular box limitation or provide larger boxes approved for additional capacity.
- G. Panel riser feeder conductors shall be identified with colored tape at panel lugs. The same phase relation shall be maintained throughout.
- H. Circuiting is indicated diagrammatically on the Drawings.

3.04 TERMINAL BLOCK INSTALLATION

- A. A maximum of one conductor shall be installed on the field-wired side of each terminal block. If rated to accept more than one conductor, a maximum of two conductors shall be installed on the enclosure-wired side of each terminal block. Provide additional terminal blocks and shorting jumpers as required.
- B. Provide a separate ground-type terminal block for each shielded-cable drain conductor.
- C. Provide ten percent spare terminal blocks for each type of connected terminal block, minimum five spare terminal blocks total. For each grouping of terminal blocks, provide 25% spare DIN rail space.
- D. Maintain a minimum of 1 1/2 inches between terminal blocks and adjacent devices and enclosure wireways.
- E. For current transformer shorting terminal blocks, the short-circuit slider shall cover the terminal block conductor screws on the meter-side of the terminal blocks when in the non-shortening position, and expose the terminal block conductor screws when slid into the shorting position.

3.05 FIELD QUALITY CONTROL

- A. Inspect wire for physical damage and proper connection.
- B. Prior to energizing, check conduit, raceways, outlet boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.
- C. Subsequent to wire hookups, energize circuitry and demonstrate functionality in accordance with these specifications.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- E. Perform field inspection and testing according to provisions of this section.

3.06 ACCEPTANCE TESTS

- A. CONTRACTOR shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of OWNER or OWNER's representative and must be passed before final acceptance of the work.
- B. CONTRACTOR shall be responsible for powered tests of each field-installed device unless specifically noted otherwise. CONTRACTOR shall be responsible for device operation as powered from its power source and signals as received at the I/O modules.
- C. Operation Test: By operational testing, OWNER will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the Drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.
- D. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test with a Megger whose rating is suitable for the tested circuit after cables are installed and before they are put into service. Tests shall meet the applicable specifications of ICEA S-95-658 and NEMA WC70. Tests shall be witnessed by ENGINEER. The insulation resistance for any given conductor shall not be less than the value recommended by the ICEA, or a minimum of one megohm for 600-volt and less service, if not ICEA listed. Any cable not conforming to the recommended value or that fails when tested under full load conditions, shall be replaced with a new cable for the full length. Provide Megger testing for conductors from SWBD-15 to the diversion structure.
- E. A written record of performance tests on electrical and control and instrumentation systems and equipment shall be supplied to OWNER. Such tests shall show compliance with governing codes.
- F. The transformer, feeder, and subfeeds to the lighting panels shall be completely phased out as to sequence and rotation. Phase sequence shall be A-B-C as follows:
 - 1. Front-to-rear, top-to-bottom, or left-to-right when facing equipment.
 - 2. Phasing shall be accomplished by using distinctive colors for the various phases. The same color or variation of it shall be used for a particular phase throughout the building and project.

3.07 WIRE INSTALLATION SCHEDULE

- A. Install all wiring in raceways except as otherwise noted. This includes all low-voltage wiring such as temperature control, instruments, network, fiber optic, etc.

END OF SECTION

SECTION 26 05 23

INSTRUMENT AND COMMUNICATION WIRE AND CABLE

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: This specification contains the requirements for instrument wire and cable as opposed to electrical power wire and cable.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Standards: Comply with standards specified in this section as listed in Division 01.
- B. Qualifications of Installers: Workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.

1.03 PRODUCT HANDLING

- A. Instrument cable shall be furnished in lengths as necessary.
- B. Reels, coils, or package rolls of instrument cable shall be identified with the project name and other tagging identification as called for.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.

1.05 QUALIFICATIONS

- A. CONTRACTOR shall have at least 10 years of experience in the installation of similar systems. CONTRACTOR shall provide documentation upon request to certify that all assigned staff have attended training courses corresponding to the type of cabling and equipment specified herein.
- B. CONTRACTOR shall currently be licensed to install low voltage electronic cabling systems in the state of the project.
- C. CONTRACTOR shall currently meet all manufacturer's requirements for the provision and installation of all equipment specified herein.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR

shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 SHIELDED PAIR CABLING FOR ELECTRONIC INSTRUMENTS

- A. Shielded cabling shall have stranded, tinned-copper conductors, No. 16 AWG, twisted with 2-inch lay.
- B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties.
- C. Color coding shall be manufacturer’s standard or as stated.
- D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 35 mils thick for shielded pair cables and 42 mils thick for shielded triad cables, with an 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.
- E. A 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A stranded, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.
- F. Single-pair shielded cables installed in above-grade conduits shall be Belden 9316, or equal.
- G. Single-pair shielded cables installed in below-grade conduits shall be Belden 9342, or equal.

2.02 SHIELDED PAIR CABLING FOR CURRENT TRANSFORMERS

- A. Shielded pair cabling shall have stranded, tinned-copper conductors twisted with 2-inch lay.
- B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 600 volts. Materials shall equal or exceed UL 13 requirements for physical properties.
- C. Color coding shall be manufacturer’s standard or as stated.
- D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 47 mils thick, and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.

- E. A 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A stranded, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.
- F. Single-pair shielded current transformer cables shall be Belden 9343 with No. 14 AWG conductors and No. 14 AWG drain wire. Current transformer cable runs over 25 feet in length, including the length of potted transformer leads, shall be Belden 9344 with No. 12 AWG conductors and No. 12 AWG drain wire. When extending potted transformer leads or when splicing conductors from shorting terminal blocks to meters with loop-through current sensors (no terminations), provide crimpless, self-soldered, tin-plated, heat shrink-type butt splices as manufactured by Raychem, Model CWT-900X, or equal.

2.03 HEAT SHRINK TUBING FOR SHIELDED INSTRUMENT CABLES

- A. Heat shrink tubing for sealing the ends of all shielded instrument cables shall be heavy-wall, low-voltage tubing as manufactured by Raychem Type WCSM, or equal.

PART 3-EXECUTION

3.01 INSTALLATION REQUIREMENTS AND SPECIAL CONSIDERATIONS

- A. Shielded pair cabling specified in this section shall be installed in conduit, and may not be run free-air or in nonmetallic tubing such as innerduct.

3.02 GROUNDING

- A. Shielded cabling shall be installed in accordance with manufacturer's instructions and to minimize electrical noise and interference to associated instruments. Refer to instrument manufacturer's instructions for additional requirements.
- B. Ends of signal wires shall be sealed to prevent the migration of moisture into the cable and to prevent unintentional grounding of the shield at the open end. Seal signal wires using a minimum 1-inch piece of heat-shrink tubing installed over PVC jacket and individual wires, and heat-shrink to a watertight fit.
- C. All shields must be grounded.
- D. Shields shall be grounded at one point only. Shielded cabling shall be isolated and left open at the instrument.
- E. Cable shield grounds shall be isolated from control system signal grounds, except at instrument system grounding electrodes.

3.03 CURRENT TRANSFORMER INSTALLATION

- A. Minimize the length of current transformer cables to maintain current transformer burdens below the specified accuracy burden limits.
- B. Shielded-pair transformer lead extension cables wired to power meters with loop-through current sensors (i.e., no current input terminals at the metering device) shall be spliced with

a short length of No. 14 AWG conductor as specified in Section 26 05 19–Wire for the final loop-through connection at the power meter. Limit the length of the conductor to maintain as much of the shielded-pair cable as possible. Splices shall use self-soldered butt splices as specified herein.

END OF SECTION

SECTION 26 05 26

SECONDARY GROUNDING

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Power System Grounding.
 - 2. Electrical Equipment and Raceway Grounding and Bonding.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.
- B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.03 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MATERIALS

- A. Ground Rods: Copper-bonded, 5/8-inch diameter; minimum length 10 feet.
- B. Ground Connections Below Grade: Exothermic type by Cadweld, compression type by ABB (Thomas & Betts), or equal. Compression connectors shall be prefilled with an oxide inhibitor.

- C. Ground Fittings: O-Z/Gedney, Type ABG, CG, TG, GBL, or equal.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Compression-type connectors shall be installed with the manufacturer recommended tools. Compression dies shall emboss an index on the connector when installed correctly. An indenter crimp shall be made on ground rods prior to connection of grounding conductor.
- B. Provide a separate insulated equipment grounding conductor for each feeder and branch circuit. Terminate each end on a grounding lug, bus, or bushing.
- C. Bond together system neutrals, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and cold water plumbing systems.
- D. Connect grounding electrode conductors to metal water piping, metal frame of building or structure, and structural reinforcing bars using suitable ground clamps. Make connections to flanged piping at a point ahead of meter or service shutoff valve. Provide jumper connection across meter or service shutoff valve.
- E. Ground system, transformer neutrals, and equipment as required by code and local ordinances.
- F. All bare copper conductors installed outdoors shall be buried a minimum of 2 feet below grade.
- G. Water system grounds and a minimum of three ground rods at 15-foot separations near service entrance of each building shall be provided and ground wires must attach to point ahead of meter or service shutoff valve. These shall be connected to ground bus by conductors sized to code requirements. The above are minimum requirements.
- H. Bends in grounding electrode conductors shall not exceed 90 degrees and shall have a minimum 8-inch bend radius.
- I. Grounding electrode conductor terminations on ground rods shall be made at a minimum depth of 2 feet below grade.
- J. Ground rods shall be installed a minimum of 2 feet horizontally from any below-grade footing or wall.
- K. All grounding electrode conductors shall be installed in PVC conduit. All conduit bends shall be made using sweep elbows. Conduit bodies and 90-degree bends are not allowed.
- L. Include ground for grounded receptacles, light fixtures, motors, and equipment items shown on the Drawings.
- M. Flexible connections do not qualify for ground. All flexible connections must have separate green ground wire from motor base, lighting fixture, or equipment frame to conduit system.

- N. Provide a separate grounding conductor system for the grounding of all lighting fixtures and devices installed in the same conduit as the branch circuit conductors. Ground conductors shall be individually connected at each fixture or device.
- O. All equipment in NEMA 4X areas that are fed from circuits in PVC conduit shall be provided with a separate green ground wire that is terminated at the metallic conduit system and the equipment.
- P. Separately derived systems as defined by the National Electrical Code shall be grounded as such. This shall include, but not be limited to, 4-wire transformers and 4-wire standby generators.
- Q. Refer to Section 26 05 23—Instrument and Communication Wire and Cable for additional grounding requirements.
- R. Exposed exterior terminations of grounding electrode conductors shall be completely sealed with the same anti-corrosion joint compound specified in Section 26 05 33—Conduit to be used on conduit threads.

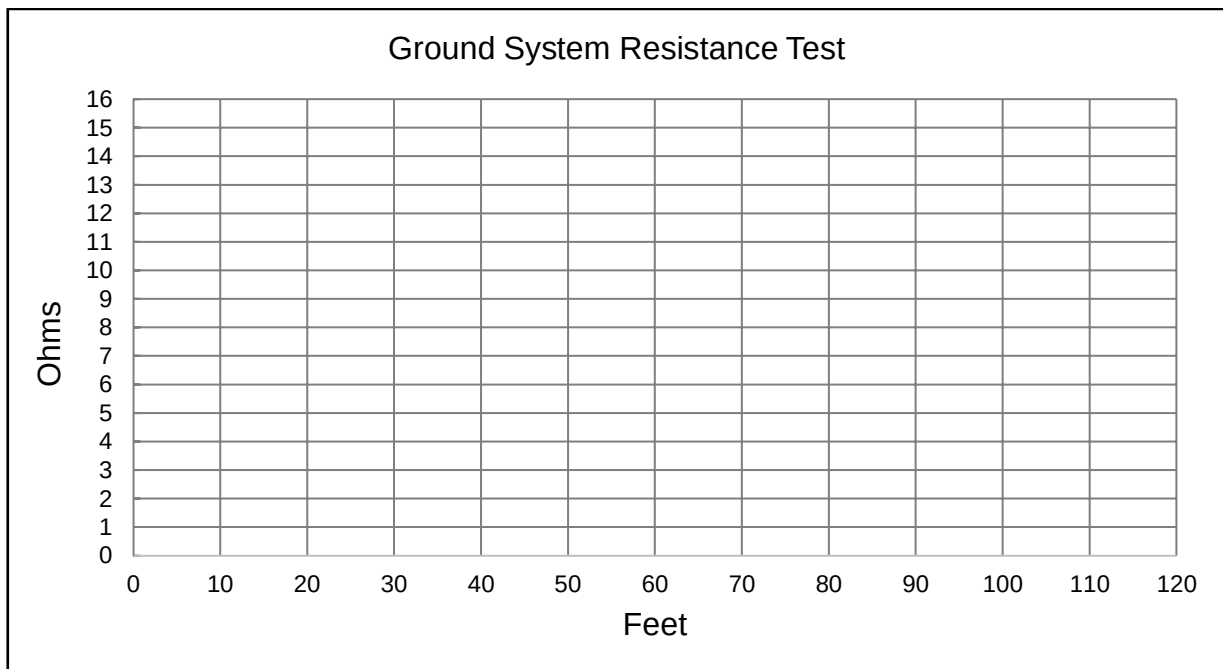
3.02 TESTING

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Provide ground system resistance test report for each ground grid. Test reports shall document ground system resistance following the three-point "Fall-of-Potential" test. The test results shall include a graph of the results plus a diagram of the testing layout. The remote current probe (C2) shall be placed a minimum of 100 feet from the ground system potential/current probe (P1/C1) or as required to provide sufficient spacing to demonstrate a resistance plateau on the graph. The ground resistance shall be tested with the potential probe (P2) between the P1/C1 probe and the C2 probe at 10% intervals starting at 0% and ending at 100% of the distance between P1/C1 and C2, 11 points total. A single point of measurement is not acceptable, and the two-point method of ground system testing shall only be used where there is no or insufficient "open earth" area to use the three-point Fall-of-Potential method. Resistance at any point in the grounding system shall not exceed 5 ohms. All ground system tests shall be witnessed by ENGINEER or OWNER. ENGINEER shall be notified a minimum of 72 hours in advance of all ground system testing.
- C. The test meter shall be Associated Research Vibroground test set with null balance, or equal. All ground system tests shall be performed in accordance with the procedures outlined in the instruction manuals of the ground system test equipment.
- D. Ground resistance testing shall be performed with all rods connected and shall be isolated from all metallic connections, such as from the ground rod to other grounded structures and electrical system neutrals.
- E. Provide test report using the attached Form 26 05 26. Each ground grid, including service entrance transformers, etc., shall have a form submitted.

END OF SECTION

GROUND ROD RESISTANCE TO EARTH TEST RECORD

1. DATE _____
2. PROJECT NAME _____
3. LOCATION OF TEST _____
4. GROUND ROD TYPE _____
DIAMETER _____ LENGTH _____
5. TEST METHOD _____
INSTRUMENT TYPE _____
SERIAL NO. _____
6. REQUIRED MAXIMUM RESISTANCE TO EARTH _____
7. MEASURED RESISTANCE TO EARTH _____
GROUND ROD SYSTEM _____



TEST PERFORMED BY: _____
Signature

TEST WITNESSED BY: _____
Signature

SECTION 26 05 29

SUPPORTING DEVICES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Conduit and Equipment Support Members.
 - 2. Fastening Hardware.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MATERIAL

- A. Support Members:
 - 1. 316 stainless steel in exterior locations, Class I locations, and damp and wet locations.
 - 2. Fiberglass in NEMA 4X chemical rooms where noted on the Drawings.
 - 3. Hot-dipped galvanized steel in all other areas.

- B. Hardware:
 - 1. 316 stainless steel in exterior locations, Class I locations, and damp and wet locations.
 - 2. Fiberglass in NEMA 4X chemical rooms where noted on the Drawings.
 - 3. PVC-coated steel clamps and stainless steel hardware with 316 stainless steel members where used to support PVC-coated rigid steel conduits.
 - 4. Hot-dipped galvanized steel in all other areas.
- C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

PART 3—EXECUTION

3.01 INSTALLATION

- A. All supporting devices and support structures shall be constructed such that the structure adequately supports the load of the equipment installed on it including any wind and/or snow loads. Provide additional support members to those shown on the Drawings to adequately support load.
- B. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs as specified in other technical sections.
- C. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- D. The ends of all support members shall be ground smooth.
- E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- F. Do not use powder-actuated anchors.
- G. Do not drill structural steel members.
- H. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.
- I. In wet locations, install free-standing electrical equipment on concrete pads. Anchor all equipment to adjacent walls with standoffs and caulk.
- J. Install surface-mounted cabinets and panelboards with a minimum of four anchors.
- K. Do not use chain, wire rope, or perforated strap hangers.
- L. All welds shall be continuous and ground smooth.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Rigid Metal Conduit and Fittings.
 - 2. Rigid Aluminum Conduit and Fittings.
 - 3. Polyvinyl Chloride (PVC) Externally and Internally Coated Galvanized Rigid Metal Conduit and Fittings.
 - 4. PVC Conduit and Fittings.
 - 5. Liquidtight Flexible Conduit and Fittings.
 - 6. Conduit Seals and Special Fittings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI C80.1—Electrical Rigid Steel Conduit (ERSC).
- B. ANSI C80.5—Electrical Rigid Aluminum Conduit (ERAC).
- C. ANSI/NEMA FB 1—Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- D. NEMA RN 1—Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal.

1.03 QUALITY ASSURANCE

- A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical materials, which have been listed and labeled by Underwriters Laboratories.
- E. Prior to shipment to the site, all conduit provided shall be new, unused material, and shall not have been stored outdoors or exposed to weather.

- F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.
- B. Handle conduit carefully to prevent end damage and to avoid scoring the finish.
- C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit: ANSI C80.1 and UL6. Heavy wall seamless tubing with hot-dipped galvanized coating.
- B. Conduit bodies for rigid steel conduit shall be as manufactured by Appleton, Form 35, or equal, and be constructed of stamped steel for sizes 2 inches and under, and cast malleable iron for sizes over 2 inches. Conduit bodies shall have domed gasketed covers and stainless steel screws. Conduit bodies sizes 1 1/4-inch and larger shall have built-in pulling rollers. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.
- C. Rigid Aluminum Conduit: ANSI C80.5 and UL6A. Heavy wall.

- D. Conduit bodies for rigid aluminum conduit shall be as manufactured by Appleton, Form 85, or equal, and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have domed gasketed covers, and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size per application.
- E. PVC-coated conduit and fittings shall be internally and externally hot dipped galvanized rigid metal conduit with hot dipped galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit, and PVC coating shall have an external 40 mil thickness with an internal 2 mil urethane coating. Acceptable manufacturers shall be Plasti-bond RedH₂OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal. All installers shall be field-certified from the factory for installation and shall provide proof of certification. PVC-coated conduit and fittings shall meet the following listings and manufacturing standards, without exception:
 - 1. ANSI C80.1.
 - 2. UL6.
 - 3. NEMA RN1.
- F. Conduit bodies for PVC-coated rigid conduit shall be as manufactured by Plasti-bond RedH₂OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal, and have a 40 mil PVC exterior coating and 2 mil red urethane interior coating. Conduit bodies shall be Form 8 style or pulling elbow and include domed, gasketed covers and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.
- G. Fittings and Conduit Bodies: ANSI/NEMA FB 1 and UL 514B; threaded-type material to match conduit. For hazardous locations, fittings and conduit bodies shall meet the requirements of UL 886. Split couplings are not allowed.
- H. Supports: One-hole straps with conduit clamps and backspacers shall be used for surface-mounted conduit. Where standoffs are required, provide conduit clamps and supporting devices as specified in Section 26 05 29—Supporting Devices. One-hole straps with conduit clamps and backspacers for PVC-coated rigid steel conduit shall be PVC-coated rigid steel material.

2.02 PVC CONDUIT AND FITTINGS

- A. Conduit: Heavy wall rigid, Schedule 40, Schedule 80 where noted, UL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV resistant.
- B. Conduit bodies for PVC conduit shall be as manufactured by Carlon, or equal, and be suitable for use with Schedule 40 or Schedule 80 PVC conduit. Conduit bodies shall have smooth hubs, textured lids, and foam-in-place gaskets. CONTRACTOR shall select body style and size per application.
- C. Supports: Two-hole nonmetallic clamps shall be used for surface-mounted conduit. Where standoffs are required, provide pipe straps and supporting devices as specified in

Section 26 05 29—Supporting Devices. Support material shall match that of the conduit type being provided.

2.03 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

- A. Liquidtight Flexible Metal Conduit:
 - 1. Conduit: Spiral-wound, electrogalvanized, single-strip steel with integral grounding conductor continuously enclosed within the entire length of the convolutions. The flexible PVC jacket shall be sunlight-resistant, flame-retardant, and resistant to damage from mild acids. Conduit shall be UL Listed. Conduit shall be Liqueflex Type LA, or equal.
 - 2. Fittings: UL listed with thermoplastic elastomer sealing gasket.
 - a. Provide stainless-steel fittings in exterior, NEMA 4X, and damp and wet locations, unless noted otherwise.
 - b. Provide electro-zinc plated steel fittings in all other areas, unless noted otherwise.
- B. Liquidtight Flexible Non-Metallic Conduit:
 - 1. Conduit: Helically-wound, Type B, PVC construction with a continuous spiral of rigid PVC embedded within the PVC wall. The flexible PVC wall shall be sunlight-resistant, flame-retardant, and resistant to damage from mild acids. Conduit shall be UL Listed and be rated for installation in Class I, Division 2, Groups C and D locations. Conduit shall be Liqueflex Type NM, or equal.
 - 2. Fittings: UL listed with thermoplastic elastomer sealing gasket. Fittings shall be non-metallic nylon and rated for use with Type B liquidtight non-metallic conduit.

2.04 CONDUIT SEALS AND SPECIAL FITTINGS

- A. Conduit seal-offs for Class I Locations: Robroy Industries Plasti-Bond Red H2OT Series EYS seal fittings and Crouse Hinds "Chico A" sealing compound, Arrow-Hart, or equal.
- B. Conduit Seals: Duct sealing compound, OZ Gedney Type DUX, or equal.
- C. Expansion Fittings: Crouse Hinds or Robroy Type XJG, or equal, for rigid or PVC-coated rigid conduit. Carlon E945 Series, or equal for PVC conduit.
- D. Expansion Deflection Fittings: O-Z type "DX," Crouse Hinds, type XD (PVC conduit only), or Appleton.
- E. Ground Bushings: Crouse Hinds Model GLL, or equal.
- F. Mechanical Seals: 316 stainless steel, Link Seal, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners.
- G. Watertight Hubs: Diecast, insulated and gasketed, rated for wet or dry locations indoors or outdoors. Watertight hubs shall be Appleton HUBXXXDN, Crouse-Hinds Myers Hubs, or equal.
- H. Conduit Plugs: Kwik N Sure pipe plug as manufactured by Cherne Industries, or equal. Plug shall include natural rubber O-ring with galvanized wing nut and hex nut.
- I. Conduit Threads Joint Compound: Kopr-shield conductive, anti-corrosion joint compound as manufactured by Thomas & Betts, or equal.

PART 3-EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduits for branch circuit conductors, control wires, and instrumentation cables so as to have not less than 25% spare capacity after installation; 3/4 inch minimum size. Minimum size for liquidtight flexible metal conduit is 1/2 inch.
- B. Maintain at least 1 inch of separation between conduit sizes to 1 1/2 inches and 2 inches between conduits 1 1/2 inches or larger. Maintain 1 foot of separation between signal conduits (below 100 volts) and power conduits (100 volts and above).
- C. All conduit shall be supported in accordance with the NEC and as specified herein. This shall apply to all conduit types, including flexible conduit.
- D. Provide for the proper application, installation, and location of inserts, supports, and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.
- E. Run conduits concealed to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid all materials and equipment of other trades. Maintain a minimum clearance of 6 inches from all hot water pipes, flues, or any high-temperature piping or ductwork.
- F. Conduits shall be attached to building surfaces and not suspended unless installed in a Unistrut-type conduit rack as specified herein. Individual conduits shall not be suspended. Clevis hangers are not allowed.
- G. Center conduit in structural slabs (other than topping), clear of reinforcing steel and spaced on centers equal to or exceeding three times the conduit diameter. Outside diameter of conduit shall not exceed one-third the slab thickness for each run of conduit 1 1/4 inches or larger. Provide shop drawings when conduit will be installed in structural slabs. Conduits shall not be run in slabs-on-grade or structural topping slabs.
- H. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice. Conduits through roofs shall be rigid metal conduit and be equipped with pitch pockets.
- I. Conduit attached to building surfaces that may be damp or wet shall be spaced out to avoid rust and/or corrosion using fittings approved for the use. Use back straps on all conduit in damp and wet locations, or mount conduit with Unistrut straps, or equal. Watertight hubs shall be used in all damp and wet locations.
- J. Conduits shall be securely fastened to building structure at intervals not exceeding 8 feet or closer, if necessary. Where hangers are necessary, 3/8-inch rod/eyelets/rings/or trapeze type in Unistrut channel and pipe clamps shall be used. Wire or perforated strap iron is not acceptable. PVC conduit shall be securely fastened to building structure at intervals not exceeding 3 feet.

3.02 GENERAL CONDUIT INSTALLATION REQUIREMENTS

- A. Interior conduit shall be run concealed in walls, building cavities, chases, attic spaces, and buried below floor slabs. Exterior conduit shall be buried below grade and concealed in structure walls. Exposed conduit runs shall be avoided. Conduit may be run exposed only where it is impossible to conceal.
- B. Run exposed conduit grouped and parallel or perpendicular to construction. Do not route exposed conduits over boilers or other high-temperature machinery nor in contact with such equipment. All conduit shall be run exposed in structures below grade.
- C. All conduit installed below grade shall be buried a minimum of 2 feet 0 inch. All conduit installed below floor slabs shall be buried a minimum of 1 foot below slab.
- D. PVC-coated rigid steel conduit and PVC conduit installed in earth (interior and exterior) shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.
- E. In all PVC conduit runs below grade 200 feet and longer, PVC coated rigid steel conduit shall be used for all 90 degree bends.
- F. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, disconnect switches, and all other components of the raceway system.
- G. Provide all empty raceways 2 1/2 inches and over with No. 10 galvanized fishwire, and nylon cord for conduits smaller than 2 1/2 inches. Empty raceways and fishwire/nylon cord shall be identified with permanent label, and label shall include conduit termination point. All empty conduits shall be threaded, capped and flush with finished floor or wall. Exposed conduits shall be threaded and capped.
- H. Provide conduit raceway for exposed cables that are not UV resistant. This shall include, but not be limited to, instrument wiring, motor terminators, etc.
- I. Conduit seals shall be provided where conduits pass from the interior to exterior of the building, any conduit entering a wet location, and any conduit entering a NEMA 4X area.
- J. Liquidtight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain toward the fittings.
- K. All runs of flexible conduit and flexible conduit couplings to equipment and devices shall be as short as practicable, of the same size as the conduit it extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.
- L. Provide conduit expansion-deflection fittings as specified herein in all conduit runs where movement perpendicular to axis of conduit may be encountered.
- M. Conduits shall be pitched so that drainage is towards handholes and away from all structures.
- N. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

- O. The PVC-coated rigid conduit manufacturer's touch-up compound shall be used on all conduit interior and exterior bare steel exposed because of nicks, cuts, abrasions, thread cutting, and reaming; minimum six coats.
- P. Where below-grade PVC conduit is connected to rigid metal conduit, the length of PVC conduit shall be a minimum of 10 feet. For short, below-grade conduit runs where required lengths of rigid metal conduit limit the length of PVC conduit to less than 10 feet, rigid metal conduit shall be used for the entire run.
- Q. Conduit bodies shall not be used for antenna cable and fiber optic cable routing. Provide pull boxes sized as required for antenna cable and fiber optic cable bending radius.
- R. Routing of conduits on exterior of buildings shall be avoided to the extent possible and shall not cover or interfere with lighting, signage, windows, louvers, or other openings. All conduit routing on exterior walls shall be reviewed with ENGINEER for approval prior to installation.
- S. Conduits installed in damp and wet locations shall have all threads coated with conduit threads joint compound.

3.03 CONDUIT PENETRATIONS AND TERMINATIONS

- A. Where fittings are brought into an enclosure with a knockout, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat type.
- B. Conduit penetrations for control panels or enclosures containing electronic equipment shall utilize watertight hubs and, if entering the top of the enclosure, shall be located at the front of the enclosure and not over any electronic equipment (e.g., PLC, power supplies, etc.).
- C. Conduit penetrations for all exterior enclosures (e.g., disconnects, junction boxes, control panels) shall utilize watertight hubs and enter the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.
- D. Provide conduit expansion fittings as specified herein in all conduit runs that cross a structural expansion joint and for conduits protruding from earth.
- E. Provide firestopping for all conduits penetrating fire barriers as specified in Section 07 84 00—Firestopping.
- F. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the poured concrete (both sides). Where an underground conduit joint or coupling is located within 4 feet of the face of the penetration, the conduit shall be provided with reinforced concrete encasement doveled into the structure wall and continuing a minimum of 1 foot past the connection. PVC-coated rigid conduit 4-foot minimum projection requirement shall begin at, and extend from, the end of the encasement. The intent of this paragraph is to permit CONTRACTOR to use couplings at the inside face of the formwork.
- G. Conduits passing through masonry, concrete, or similar construction shall be cast in place using PVC-coated rigid conduit extending completely through the construction.

- H. Where above-grade conduits pass through cores in existing structures or through masonry walls, grout openings between conduit and walls or floors with sand cement mortar.
- I. Where wall penetrations through existing walls are below grade, cored openings shall be sealed with waterproof mechanical seals. Cores shall be pitched slightly such that conduit slopes away from building. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the wall (exterior).
- J. All spare conduits that terminate in a building or structure below grade shall be plugged with conduit plugs as specified herein.

3.04 CONDUIT INSTALLATION IN HAZARDOUS LOCATIONS

- A. All conduits installed in or passing through Class I locations as defined by the NEC, NFPA, or as noted on the Drawings, shall be installed with seal-offs as specified herein.
- B. All conduits in hazardous locations shall be installed in accordance with the NEC.

3.05 CONDUIT INSTALLATION FOR EMERGENCY LIGHTING AND POWER CIRCUITS

- A. All emergency egress lighting circuits shall be installed in dedicated conduits.
- B. Conduits for emergency lighting shall be installed and permanently marked in accordance with the NEC.

3.06 CONDUIT INSTALLATION SCHEDULE

- A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed:
 - 1. Rigid steel:
 - a. Structural slabs.
 - b. Interior locations requiring mechanical protection.
 - c. All exposed interior locations.
 - d. All concealed interior locations.
 - 2. Rigid aluminum:
 - a. All exposed interior locations.
 - b. Interior locations requiring mechanical protection.
 - c. Exterior locations (except in earth) and locations exposed to weather.
 - d. All locations where attached to aluminum railings or aluminum structural members.
 - 3. PVC-coated rigid steel:
 - a. Conduits protruding from concrete.
 - b. Interior and exterior locations requiring mechanical protection.
 - c. Earth.
 - d. Exterior locations and locations exposed to weather.
 - e. Within 4 feet of building or structure footing, wall, or handhole.
 - 4. PVC:
 - a. Earth, except conduits serving Class I locations and within 4 feet of a building or structure footing, wall, or handhole. PVC conduit under pavement or roadways shall be Schedule 80.
 - b. NEMA 4X areas (indoors only).
 - c. Grounding electrode conductors.

- d. Buried below slabs on grade.
- 5. Liquidtight flexible metal conduit not over 3 feet in length for final connections to:
 - a. Equipment with sliding bases or flexible positioning.
 - b. Equipment with vibration isolation mounting.
 - c. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including transformers and motors.
 - d. All pumps and associated equipment.
- 6. Liquidtight flexible non-metallic conduit not over 3 feet in length for final connections to equipment in the chemical rooms.

END OF SECTION

SECTION 26 05 35

BOXES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Switch, Outlet, and Small Junction Boxes.
 - 2. Pull and Junction Boxes.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this section.

1.02 REFERENCES

- A. ANSI/NEMA OS 1—Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- B. ANSI/NEMA OS 2—Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
- C. NEMA 250—Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

- A. Manufacturers of switches, outlets, boxes, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation Work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical cable, boxes, raceways, wire, connectors, outlets, switches, etc. that have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR

shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 SWITCH, OUTLET, AND SMALL JUNCTION BOXES

- A. Masonry and Partition Boxes: Galvanized steel, nongangable. ABB (Thomas & Betts), MB Series, or equal. Provide number of gangs for devices shown on the Drawings.
- B. Cast Boxes: Aluminum or cast ferrous alloy, deep-type, gasketed cover, threaded hubs, Eaton FD Series, or equal.
- C. PVC-Coated Cast Boxes: Boxes shall be deep type and be by the same manufacturer as the conduit.
- D. NEMA 4X Boxes:
 - 1. Switch and Outlet Boxes: PVC or FRP, Carlon FD Series, or equal with proper cover and gasket. 316 stainless steel, Calbrite FDC Series, or equal where specified herein.
 - 2. Small Junction Boxes: PVC or FRP, Carlon HS Series, or equal with proper cover and gasket.
- E. Covers for junction boxes shall have covers that match box type.

2.02 PULL AND JUNCTION BOXES

- A. PVC-Coated Cast Boxes: Provide PVC-coated cast boxes in areas where PVC-coated conduit is used; in nonhazardous locations, provide cast boxes. Boxes shall be by the same manufacturer as the conduit. Boxes in nonhazardous locations larger than 12 inches in any dimension shall be NEMA 4X boxes.
- B. NEMA 4X Boxes: PVC or FRP, Carlon HS Series, or equal with hinged cover, gasket, and locking system. Boxes shall be 316 stainless steel with hinged cover, recessed quarter-turn padlocking latches, and gasket, Saginaw Control and Engineering Enviroline Series, or equal, where specified herein.
- C. NEMA 12 Boxes: Painted steel with hinged cover, recessed quarter-turn padlocking latches, gasket, and locking system. Boxes shall be Hoffman CSD, or equal.
- D. Where terminal blocks or other devices are mounted in a pull or junction box, provide a 14-gauge steel back panel with a white enamel finish for mounting.

- E. All enclosures with double doors or that are free-standing shall have a three-point latch.
- F. Boxes specified in this section are not allowed to have knockouts and are not allowed to be used as enclosures for control panels.

PART 3—EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on the Drawings and as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.
- B. Electrical box locations shown on the Drawings are approximate. Verify location and size of outlet boxes in all work areas prior to rough-in.
- C. Where dedicated raceways are provided for different voltage systems or wiring, (e.g., motor power wiring and motor space heaters), separate boxes shall also be provided unless acceptable to ENGINEER. Where acceptable to ENGINEER, combined boxes shall be physically divided to separate the wiring.
- D. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of access doors.
- E. Locate and install to maintain headroom and to present a neat appearance.
- F. All boxes attached to building surfaces that may be damp or wet shall be spaced to avoid rust and/or corrosion. All boxes in damp and wet locations shall be on 1/2-inch standoffs.

3.02 SWITCH, OUTLET, AND SMALL JUNCTION BOX INSTALLATION

- A. Locate boxes in masonry walls for cutting of masonry unit corners only. Coordinate masonry cutting to achieve neat openings for boxes.
- B. Provide knockout closures for unused openings.
- C. Support boxes independently of conduit.
- D. Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- E. Install boxes in walls without damaging wall insulation.
- F. Coordinate mounting heights and locations of outlets mounted above counters.
- G. Switch and outlet boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring and wiring for emergency egress lighting shall each have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g., 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.
- H. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

- I. In unplastered brick or block walls, use masonry boxes.
- J. In metal door frames, use partition boxes.
- K. For weatherproof switches, devices, and exterior fixtures, use cast boxes with proper cover and gasket.
- L. All interior exposed wall and ceiling outlet boxes shall be cast boxes, unless otherwise noted.
- M. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable, except for masonry boxes.
- N. Boxes shall be of a depth to accommodate wires and splices and shall be equipped with both fixture hanging studs and tapped fixture ears. Boxes shall be installed so that they will support the weight of the fixture. Conduit will not be considered as adequate supports.
- O. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.
- P. Provide PVC-coated cast boxes in all areas where PVC-coated conduit is used.
- Q. PVC or FRP NEMA 4X boxes shall be provided only where noted on the Drawings.

3.03 PULL AND JUNCTION BOX INSTALLATION

- A. Support pull and junction boxes independent of conduit.
- B. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.
- C. Refer to Section 26 05 53—Electrical Identification for junction box labeling requirements.
- D. All interior exposed boxes and all interior boxes with a dimension equal to or greater than 12 inches, including boxes above suspended ceilings, shall be NEMA 12, unless noted otherwise.
- E. All exterior boxes shall be NEMA 4X, stainless steel.

END OF SECTION

SECTION 26 05 44

HANDHOLES

PART 1–GENERAL

1.01 DESCRIPTION

- A. Work Included: Precast Polymer Concrete Handholes.
- B. Related Sections: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/SCTE 77–Specification for Underground Enclosure Integrity.
- B. ASTM D4101–Specification for Polypropylene Injection and Extrusion Materials.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Shop drawing submittals shall include the following:
 - 1. Interior elevations of each wall of all handholes provided under this Contract. Each conduit shall be identified as to what it serves.
 - 2. Product data: Manufacturer's technical information for handholes and accessories proposed for use.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 PRECAST POLYMER CONCRETE HANDHOLES

- A. Material and Construction:
 - 1. Precast polymer concrete.
 - 2. Duct entrances sized and located to suit duct banks.
 - 3. Enclosures, boxes and covers are required to conform to test provisions of ANSI/SCTE 77 for Tier 22 applications.
 - 4. Handholes shall be a minimum of 30 inches deep. Handholes shall be sized in accordance with the NEC.
 - 5. Covers shall have the following stamped logo: “ELECTRIC”
 - 6. Handholes shall be Hubbel, Quazite, PG-Style, or equal.
 - 7. Handholes for loop detector lead-in cables only shall be Quazite Model PC1212BA12 with Tier 15-rated, gasketed cover Model PC1212GA00, or equal.

PART 3–EXECUTION

3.01 INSPECTION AND COORDINATION

- A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 HANDHOLE INSTALLATION

- A. Coordinate handhole installation with piping, sheeting, and other underground systems and structures, and locate clear of interferences.
- B. Install handholes where shown and verify locations in field. Perform excavation and backfilling required for installation. Excavation and backfilling shall be in accordance with Section 26 05 00–General Electrical Requirements.
- C. Install handholes on a 3/4-inch crushed stone foundation 1 foot under all handholes, and within 2 feet of handholes. Handhole bases shall be set at the proper grade and carefully leveled and aligned.
- D. All conduits must enter the sides of handholes. Hole saw one opening for each conduit entry closely sized to the outside diameter of the conduit, and provide stainless-steel locking nuts and washers on the inside and outside faces of the handhole to secure the conduit to the wall of the handhole. Provide an insulated throat bushing with ground lug on the conduit end inside the handhole. Conduits entering the bottom will not be permitted. Conduits shall enter handholes a minimum of 6 inches above bottom of handhole. Provide handhole depth as required.
- E. Handholes shall be considered wet locations for purposes of equipment selection.
- F. All conduits shall be pitched so that drainage is towards handholes and away from all structures.

- G. Provide a ground rod as specified in Section 26 05 26—Secondary Grounding inside each handhole. Bond the ground rod to the ground lugs on all insulated throat bushings installed on the ends of each conduit entering the handhole using a bare copper conductor sized per the NEC.

3.03 GRADING AT HANDHOLES

- A. Handholes in unpaved areas shall be built as shown to a rim elevation higher than the original ground. The ground surface shall be graded to drain away from the handhole. Fill shall be placed around handholes to the level of the upper rim of the handhole frame, and the surface evenly graded on a one (vertical) to five (horizontal) slope to surrounding ground, unless otherwise shown.
- B. CONTRACTOR shall be solely responsible for proper height of handholes necessary to reach final grade. ENGINEER's review of shop drawings for handhole components is general in nature, and CONTRACTOR shall provide random length handhole riser sections to adjust handholes to meet field conditions for final grading.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Nameplates.
 - 2. Labeling Tags.
 - 3. Wire and Cable Markers.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Provide schedule for nameplates and labeling tags with shop drawings. Reference Drawings for type used.

1.03 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 NAMEPLATES

- A. Nameplate material shall be multi-color, two-layer, nonconductive engraving plastic suitable for permanent installations in indoor and outdoor locations. The material shall be UV-resistant and suitable for installation in direct sunlight.

- B. Type "A":
1. Use:
 - a. VFDs.
 - b. Each separate disconnect switch.
 - c. Each device in switchboards.
 - d. SPD.
 - e. Each device on SCADA panel exterior.
 - f. Cabinets, enclosures, pull, and junction boxes.
 - g. Field devices (flowmeter transmitters, level transmitters, chemical scales, chemical leak detectors, etc.).
 - h. Panelboards.
 2. Size: 2 inches by 4 inches.
 3. Background Color: Black.
 4. Character Color: White.
 5. Character Size: 1/2-inch.
 6. Engraving: See VFD schedule, one-line, and I/O list for labels, or as requested by ENGINEER. Label shall include equipment number and description (i.e., SCAL-60-01, Fluoride Scale).
 7. Mounting Location: Front exterior.
- C. Type "B":
1. Use:
 - a. Standby power systems.
 - b. Automatic Transfer Switches.
 2. Size: 2 inches by 4 inches.
 3. Background Color: Red.
 4. Character Color: White.
 5. Character Size: 1/4-inch.
 6. Engraving: See one-line for labels, or as requested by ENGINEER.
 7. Mounting Location: As requested by ENGINEER.
- D. Type "C":
1. Use:
 - a. Switchboards.
 - b. SCADA panels.
 - c. Transformers.
 2. Size: 4 inches by 4 inches.
 3. Background Color: Black.
 4. Character Color: White.
 5. Character Size: 2 1/4 inches.
 6. Engraving: Equipment label shall include equipment number and description (i.e., LP-10-01, First Floor Power Panel).
 7. Mounting Location: Equipment: Top wire way.
- E. Type "D":
1. Use: Control stations, thermostats, conduit fittings, etc.
 2. Size: 1/2-inch by 4 inches.
 3. Background Color: Black.
 4. Character Color: White.
 5. Character Size: 1/4-inch.
 6. Engraving: Control station number and equipment description (e.g., T-15-01, Chlorine Room).
 7. Mounting Location: Device front at top.

- F. Type "E":
 - 1. Use:
 - a. Fire Alarm System.
 - b. Intrusion Alarm System.
 - c. Operator Instructions.
 - 2. Size: As necessary.
 - 3. Background Color: Yellow.
 - 4. Character Color: Black.
 - 5. Character Size: 1/4-inch.
 - 6. Engraving and Mounting Location: As requested by ENGINEER.

2.02 LABELING TAGS

- A. Labeling tag material shall be multi-color, 2-layer, nonconductive engraving plastic suitable for permanent installations in indoor and outdoor locations. The material shall be UV-resistant and suitable for installation in direct sunlight.
- B. Use: Field-mounted devices without surfaces suitable for mounting fixed nameplates (Valves, Limit Switches, Level Transmitters, Flow Transmitters, etc.).
 - 1. Size: 3/8-inch by 2 inches.
 - 2. Character Size: 1/4-inch.
 - 3. Engraving: As requested by ENGINEER.

2.03 WIRE AND CABLE MARKERS

- A. Wire and cable markers shall be permanently-attached, heat-shrink type labels.
 - 1. Sleeve: Permanent, PVC, white, with legible machine-printed black markings.
 - 2. Acceptable Manufacturers: Raychem Model D-SCE or ZH-SCE, Brady Model 3PS, or equal.
 - 3. Grounding Conductor: Provide green wire marker; minimum 2 inches wide.
- B. Wire or cable numbering preprinted on the conductor or cable insulation, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable. All wire markers shall be the same throughout the project.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Affix nameplates with weatherproof, UV-resistant adhesive in outdoor locations and sticky back adhesive in indoor locations.
- D. Affix labeling tags with stainless steel leaders; vinyl locking wire ties are not acceptable. Provide 3/8-inch hole to accommodate wire tie.

- E. Prepare and install neatly-typed circuit directories and schedules in all panels, including, but not limited to, panelboards and fiber optic patch panels where Work is done under this Contract.
- F. Labeling tags shall only be used for equipment enclosures without surfaces suitable for mounting fixed nameplates.

3.02 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor, including neutral and spare conductors, in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Neutral conductor labels shall include the associated branch circuit number. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Spare conductors shall have control wire number or shall indicate termination point of wire.
- B. Conductors in pull boxes, SCADA panels, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system. All wiring labels shall be able to be read without removing wire management (i.e., wiring trough covers, spiral windings, etc.) or twisting the wire/cable.
- C. Where terminal blocks are factory provided with non-project-specific labels by equipment manufacturers in VFDs, control panels, and similar equipment and are wired to terminal blocks in control panels with project-specific labels, the interconnecting wiring shall be labeled at both ends to match the project-specific terminal blocks in the control panel. Provide an additional label on the end of each wire that is connected to a terminal block with a non-project-specific label to indicate the associated terminal block.
- D. Power Conductor Insulation Color Code:
 - 1. 6 AWG and Larger: Provide general-purpose, flame-retardant, permanent tape at each termination and at accessible locations such as handholes, junction and pull boxes, panelboards, switchboards, etc. Apply tape with at least six full, overlapping wraps; minimum 2 inches wide.
 - 2. 8 AWG and Smaller: Provide conductors with color-coded insulation.
 - 3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
120/240 Volts Single-Phase, Three-Wire	Grounded Neutral	White*
	One Hot Leg	Black
	Other Hot Leg	Red
120/208 Volts Three-Phase, Four-Wire	Grounded Neutral	White*
	Phase A	Black
	Phase B	Red
	Phase C	Blue
277/480 Volts Three-Phase, Four-Wire	Grounded Neutral	White*
	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
Note: Phase A, B, C implies direction of positive phase rotation.		

System	Conductor	Color
* When installed as part of a 120-volt branch circuit, provide a color-coded stripe on the white neutral conductor insulation matching the branch circuit insulation.		

E. Control Panel and Field-Installed Control Conductor Insulation Color Code:

1. All conductors shall have color-coded insulation.
2. Colors:

System	Conductor	Color
Supply Voltage	Ungrounded Circuit Conductors Neutral	Black White
Discrete 120-volt AC Input/Output	Control Circuit Conductor Neutral	Red White
Discrete 12/24-volt DC Input/Output	Control Circuit Conductor Common	Blue White with Blue Stripe
Conductors energized when the main disconnect is in the "off" position (e.g., foreign supply voltages)	Control Circuit Conductor AC Neutral DC Common Ground	Orange White White with Blue Stripe Green

F. Circuit Identification:

1. Identify power, instrumentation, and control conductors at each termination and at accessible locations such as handholes, junction and pull boxes, panelboards, VFD enclosures, switchboards, etc.
2. Conductors for panelboard circuits shall identify circuit matching the circuit directory designations, including the neutral conductor.
3. Control conductor identification shall match the associated terminal block label.
4. Circuits Not Listed in Circuit Directories:
 - a. Assign circuit name based on unique device or equipment at load end of circuit.
 - b. Where unique device or equipment names are not available or apparent, add a unique number or letter modifier to each otherwise identical circuit name.

3.03 DATA CABLE AND COMMUNICATION EQUIPMENT IDENTIFICATION

- A. Individual labels shall be placed on both ends of all cables.
- B. Refer to Section 26 05 23—Instrument and Communication Wire and Cable for cable insulation and jack color requirements.

3.04 JUNCTION BOX IDENTIFICATION

- A. All junction boxes shall be labeled with permanent nameplates. Nameplates shall indicate circuit or load served, as well as the power source and highest voltage present on any conductor.

3.05 CONDUIT FITTINGS IDENTIFICATION

- A. All conduit fittings that contain splices of any kind shall be labeled with permanent nameplates indicating "splice within." Nameplates shall be clearly visible at location installed. Nameplates shall be fastened to each conduit fitting with heavy duty, UV-resistant, cold weather cable ties.

3.06 TERMINAL BLOCK IDENTIFICATION

- A. Terminal blocks shall be labeled on both sides of each terminal block. Terminal block numbering shall match the numbers shown on the project-specific wiring diagrams.
- B. Fused terminal blocks labels shall be located on top of the terminal blocks and include the fuse voltage and ampere rating.

3.07 COMPONENT IDENTIFICATION

- A. All components (e.g., relays, timers, power supplies, transformers, etc.) within enclosures shall be identified with sticky-back adhesive, self-laminating, machine-printed marking labels. Labels shall be installed on the enclosure back panel and not on the device itself, wireway covers, or any other removable devices. Labels shall be included on the as-built drawings.

3.08 LABELING FONT REQUIREMENTS

- A. The font for all conductor, cable, and device labels shall be Arial with black characters on white background, and minimum font size 12.
- B. The text for all conductor, cable, and device labels shall be machine printed. Handwritten labels are not acceptable.

END OF SECTION

SECTION 26 05 73

POWER SYSTEM STUDY

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: CONTRACTOR shall retain the services of an independent third-party firm to perform a power system study of the electrical distribution system shown on the Drawings and described herein. The third-party firm shall be responsible for collecting all data and information required to complete this study. The power study shall include Short-Circuit, Coordination, and Arc Flash Assessments as specified herein. The initial power system study shall be submitted prior to receiving final approval of the equipment shop drawings and prior to release of equipment for manufacture.
- B. The assessment shall include all portions of the new and existing electrical distribution system including, but not be limited to, the following items. Equipment not specifically noted below that is part of the distribution system shall also be included.
 - 1. Utility service entrance including primary switching and fusing.
 - 2. Automatic transfer switches.
 - 3. Standby generators.
 - 4. Switchboards.
 - 5. Motor control panels.
 - 6. Lighting panels.
 - 7. Disconnect switches.
 - 8. Motors rated 50 hp and larger.
- C. Normal system connections and those which result in maximum fault conditions shall be adequately covered in the power system study. Alternative scenarios shall be included to illustrate normal and standby power sources and the relative effects on the distribution system.
- D. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/IEEE Standards C37, 242, and 399.
- B. IEEE Standard 1584—IEEE Guide for Performing Arc Flash Hazard Calculations.
- C. NFPA70—National Electrical Code.
- D. NFPA70E—Standard for Electrical Safety in the Workplace, Latest Edition.
- E. OSHA 29 Code of Federal Regulations (CFR) Part 1910, Subpart S.
- F. UL 489—Underwriters Laboratories.

1.03 QUALITY ASSURANCE

- A. The third-party firm shall be NETA accredited and currently involved in high- and low-voltage power system evaluation. The power system study shall be performed, stamped, and signed by a registered professional engineer (electrical) in the State where the project is located. Credentials of the individual(s) performing the study and background of the firm shall be submitted to ENGINEER for review prior to start of the work. A minimum of 5 years of experience in power system analysis shall be required for the project manager.
- B. The firm performing the power system study shall demonstrate capability and experience to provide assistance during start-up, as required.

1.04 SUBMITTALS

- A. The following submittal process shall be followed and be coordinated with the suppliers of equipment specified in other Divisions, along with other Division 26 sections. The report specified below shall be completed prior to equipment shop drawings being approved and prior to equipment being released for manufacture, such that equipment changes may be made during shop drawing review if changes are recommended by the report. If completion of the report may cause delay in equipment manufacture, partial approval from ENGINEER may be obtained if the preliminary submittal includes data sufficient to determine that the selection of device ratings, settings, and characteristics will be satisfactory.
- B. The following submittals shall be provided for review.
 - 1. Statement of Qualifications: Prior to equipment shop drawings being submitted, the third-party firm shall submit a statement of qualifications including resumes of individuals who will perform the work, specific software and analysis tools that will be used, and at least three example reports that were completed for projects similar in size and nature.
 - 2. Initial Power System Study Report: At the time of, or prior to equipment shop drawings being submitted, the finalized report shall be submitted for review. The report shall include all new equipment being provided based on shop drawing submittals, existing equipment based on information collected during site visits, and estimated cable lengths. The report shall also include a written document from the utility company indicating single-phase and three-phase short circuit contributions and X/R ratios for each utility service. This submittal shall be a completed, finalized report that will be updated with actual cable lengths once installed.
 - 3. Final Power System Study Report: Once all equipment is operating based on its design intent, the recommended overcurrent protective device setting adjustments shall be completed. The third-party firm shall visit the site to confirm that the new equipment matches the shop drawings. Additionally, the initial power system study report shall be updated with actual installed cable lengths and changes made during construction. This shall be completed prior to substantial completion.
- C. The final power system study report shall meet the following requirements:
 - 1. Submit two bound copies of the final report. Provide two USB flash drives with the final report in PDF format. The two USB flash drives shall also include all report files in Word format, one-line diagrams in PDF and CAD formats, and all power analysis software files and associated libraries.
 - 2. Organize and submit the report with the following sections. Below are minimum requirements:
 - a. Part I: Overview.

- b. Part II: Short-Circuit Assessment:
 - (1) Purpose.
 - (2) Explanation of data.
 - (3) Assumptions.
 - (4) General and specific procedures followed.
 - (5) Analysis of results.
 - (6) Recommendations.
 - (7) Fault Analysis Input Report.
- c. Part III—Coordination Assessment:
 - (1) Purpose.
 - (2) Explanation of data.
 - (3) Assumptions.
 - (4) General and specific procedures followed.
 - (5) Analysis of results.
 - (6) Recommendations, including trip curves and device settings for project-specific equipment.
 - (7) Spreadsheet or report showing the range of all device settings and recommended settings.
- d. Part IV—Arc Flash Hazard Assessment:
 - (1) Purpose.
 - (2) Explanation of data.
 - (3) Assumptions.
 - (4) General and specific procedures followed.
 - (5) Analysis of results, including arcing fault currents, device clearing times, incident energy levels, working distances, flash protection boundary, and recommended personal protective equipment (PPE).
 - (6) Recommendations, including system modifications that may reduce arc flash hazard based on analysis of results.
 - (7) Arc flash evaluation report including sample labels for major distribution equipment.
- e. Appendices:
 - (1) One-line diagrams of the system in similar format as the Contract Documents from the power analysis software showing project-specific equipment, wire and cable types and lengths, fault currents, and recommended device settings.
 - (2) Protective device summaries generated by the power analysis software.
 - (3) Reference data.
 - (4) Paper copy of warning labels to be provided for the project.

D. Refer to Part 3—Execution for additional requirements and specific analyses to be performed.

PART 2—PRODUCTS

2.01 POWER SYSTEM STUDY SOFTWARE

- A. The power system study shall be performed using the latest version of SKM Power Tools or EasyPower Suites software utilizing all required evaluation modules to perform the assessments specified herein.

2.02 ARC FLASH HAZARD LABELS

- A. Labels shall be provided for new equipment shown on the one-line diagrams on the Drawings and as specified in all Division 26 sections. This shall include junction boxes and disconnect switches for motors 50 hp and larger. A separate label shall be installed on each panelboard, generator, automatic transfer switch, etc. Provide labels as manufactured by Brady, or equal, and meet the following minimum requirements:
 - 1. Self-adhesive, vinyl, 6 inches by 4 inches minimum.
 - 2. Equipment identification corresponding to the Contract Documents.
 - 3. Study date.
 - 4. Arc-flash boundary.
 - 5. Incident Energy Working Distance.
 - 6. Nominal system voltage.
 - 7. Shock-hazard boundaries.
 - 8. Site specific PPE level.
 - 9. Available incident energy.
 - 10. Bolted fault current.

2.03 ONE-LINE DIAGRAM

- A. Provide a one-line diagram meeting the requirements of IEEE/ANSI Standard 141, printed on a 24-inch by 36-inch minimum sheet, framed and covered with plexiglass.

PART 3-EXECUTION

3.01 DATA COLLECTION

- A. Third-party firm shall gather the required data from shop drawings for preparation of the power system study. The firm performing the power system study shall visit the site as needed to properly carry out the work and meet the requirements of these specifications.
- B. Third-party firm shall expedite collection of the data to complete the power system study within the deadlines specified herein. The following minimum information shall be collected and used:
 - 1. Available fault current from the electric utility company serving the facility.
 - 2. If applicable, existing equipment ratings including bus bracing, interrupting device ratings, and age/condition.
 - 3. Installed cable lengths, along with the specific rating, type and manufacturer.

3.02 SHORT-CIRCUIT AND COORDINATION ASSESSMENTS

- A. Include in the appropriate report sections noted above, calculation methods and assumptions, base per unit quantities selected, one-line diagrams, source impedance data including power company system characteristics, typical calculations, and recommendations. Calculations shall be provided for multiple distribution system scenarios when source equipment can provide multiple power feeds to downstream equipment (i.e., standby generators, etc.).
- B. Calculate short-circuit interrupting and momentary (when applicable) duties for an assumed three-phase bolted fault at each new bus (each change of impedance), transformer primary and secondary terminals, switchboard, as well as other significant locations throughout the

system, including all three phase motors 50 hp and larger. Provide a ground fault current assessment for the same system areas, including the associated zero sequence impedance data. Include in tabulations, fault impedance, X to R ratios, asymmetry factors, motor contribution, short-circuit kVA, and symmetrical and asymmetrical fault currents.

- C. In the Coordination Assessment, provide time-current curves for new and existing distribution equipment, indicating the coordination proposed for the system, centered on conventional, full-size, log-log forms. Include with each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered by that particular curve sheet. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time-delay settings.
- D. Include on the curve sheets power company relay and fuse characteristics, low-voltage equipment circuit breaker trip device characteristics, pertinent transformer characteristics, and characteristics of other system load protective devices such as protective relaying equipment. Include at least all devices down to the largest three-branch or feeder circuit breakers in each new and existing piece of distribution equipment. Also include the main circuit breaker (if applicable) and upstream overcurrent protective device.
- E. Include all adjustable settings for new ground fault protective devices. Include manufacturing tolerance and damage bands in plotted circuit breaker characteristics. Show transformer full load and 150, 400, or 600% currents, transformer magnetizing inrush, ANSI transformer withstand parameters, and significant symmetrical and asymmetrical fault currents. Terminate device characteristic curves at a point reflecting the maximum symmetrical or asymmetrical fault current to which the device is exposed.
- F. Select each primary protective device required for a Delta-Wye connected transformer so that its characteristic or operating band is within the transformer characteristics, including a point equal to 58% of the ANSI withstand point to provide secondary line-to-ground fault protection. Where the primary device characteristic is not within the transformer characteristics, show a transformer damage curve. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by a 16% current margin to provide proper coordination and protection in the event of secondary line-to-line faults.
- G. Include complete fault calculations as specified herein for each source combination for new equipment. Note that source combinations may include generators as noted on one-lines.
- H. Utilize equipment load data for the assessment obtained by third-party firm from Contract Documents.
- I. Include fault contribution of all motors and generators in the assessment. Motors rated 50 hp and larger shall be modeled individually and not grouped as a single load. Notify ENGINEER in writing of circuit protective devices not properly rated for fault conditions. Provide recommended settings for motor starters and note any system inadequacies or potentially hazardous conditions. Show each MCC full-load current plus symmetrical and asymmetrical of the largest motor-starting current so that protective devices will not trip major or group operation.
- J. When a generator is provided, include phase and ground coordination of the generator protective devices to meet NEC requirements. Show the generator decrement curve and

damage curve along with the operating characteristic of the protective devices. Obtain the information from the generator manufacturer and include the generator actual impedance value, time constants, and current boost data in the study. Do not use typical values for the generator.

- K. Evaluate proper operation of ground fault relays in four-wire distribution systems when generators are provided, and discuss the neutral grounds and ground-fault current flows during a neutral-to-ground fault.

3.03 ARC FLASH HAZARD ASSESSMENT

- A. Include in the appropriate report sections noted above, the following minimum requirements:
 - 1. Determine and document all possible utility and generator sources and scenarios that are capable of being connected to each piece of electrical gear. Calculations shall be based on the highest possible source connection.
 - 2. Arc flash values for two normal cases to define the highest values (low short-circuit and high short-circuit).
 - 3. Arc flash values for two maintenance cases which define the arc flash values available at the equipment, which would be available if the instantaneous trip of the upstream circuit breaker is set at a minimum value. This is recommended for personnel working on live equipment.
 - 4. Recommendations to reduce the arc flash incident energy in all areas that require 8 cal/cm² and higher PPE.
 - 5. Calculations shall conform to the latest version of the National Fire Protection Association (NFPA) 70E calculation standards. All incident energy units shall be calculated in calories per square centimeter.
- B. Provide labeling as specified herein based upon the results of the assessment.

3.04 FIELD SETTINGS

- A. CONTRACTOR shall perform field adjustments of the new and existing protective devices as required to place the equipment in final operating condition. The adjustments shall be in accordance with the recommended settings described in the final power system study report.
- B. Following energizing and placement into operation of all equipment, CONTRACTOR shall include a minimum of two additional trips to the site to make modifications to the settings for proper operation of the system.

END OF SECTION

SECTION 26 09 00

CONTROLS AND INSTRUMENTATION

PART 1–GENERAL

1.01 SUMMARY

- A. Allowances: System Supplier shall include in the Bid the cost of the following items specified in this section. Refer to the individual sections listed below for a complete description of the work required. Computer Allowance, Paragraph 2.01–SCADA System Computers and Software.
- B. Related Sections and Divisions:
1. Applicable provisions of Division 01 shall govern work in this section.
 2. Section 26 09 10–Controls and Instrumentation Drawings.
 3. All other sections of Division 26.

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1.02 SYSTEM DESCRIPTION

- A. The work includes furnishing, delivering, installing all items furnished, and placing in operation modifications to the Supervisory Control and Data Acquisition (SCADA) System for the City of Crest Hill Water Utility Sites.
- B. System Supplier shall be defined as the fabricator, assembler, and supplier of all system components. This shall include, but not be limited to, all instrumentation as specified, all PLC cabinets and required interface hardware and internal wiring, hardware, system drawings, and modification drawings as necessary.
- C. System Supplier shall be responsible for development of the SCADA System computer HMI graphics as specified herein. System supplier shall be responsible for all OIP graphics programming.
- D. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a complete installation operating in accordance with these specifications and the Bidder's proposal, whether necessary items and equipment are contained in, or are remote from the enclosures furnished under this Contract. All responsibility for this system ultimately lies with CONTRACTOR.
- E. CONTRACTOR shall be responsible for the placing of circuits and making of electrical connections in accordance with System Supplier-furnished drawings, instructions, and field supervision to provide proper connection. CONTRACTOR shall include the services of a System Supplier factory engineer to supervise the making of connections to power supplies, motor leads, communication circuits, and any other connections external to the new control

equipment; adjust the equipment; initiate and check operation; instruct OWNER's electrician on operation and maintenance of the equipment; and place the equipment in operation in an acceptable manner. This shall include on-site review of software/hardware controls from the central control point.

- F. Any auxiliary interface relays and controls needed for completion of this project, if not specifically called for, shall be by System Supplier.

1.03 QUALITY ASSURANCE

- A. System Suppliers: Firms regularly engaged in the design and manufacture of SCADA systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.
- B. Installer: A firm with at least 10 years of successful installation experience on projects with SCADA System design and installation work similar to that required for the project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide control panels, power supplies, controllers, relays, wire, and connectors that have been listed and labeled by Underwriters Laboratories.
- E. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's Standard of Installation.

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.
- B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- C. Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.
- D. Shop drawing submittals shall be assembled in phases.
 - 1. The first submittal shall include the following:
 - a. Detailed catalog information, descriptive literature, and specifications of hardware and software. All items being provided must be specifically noted on this literature, including all field devices and instruments.
 - b. Project implementation plan, including information on project organization, project management, engineering, programming, configuration, training, startup, and maintenance services. Plan shall include key personnel on project, point of contact, and communication protocol.
 - c. Overall network schematic showing all controllers, radios, network switches, fiber optic patch cables, and hardware addresses applicable to the system.
 - d. Wiring diagrams for all control panels, including modification drawings for existing equipment. Modification drawings shall be completed using electronic CAD software. Handwritten or PDF markups of any kind will not be allowed.

2. Subsequent submittals shall include the following:
 - a. Control narratives.
 - b. HMI and OIP graphic displays (graphics shall be submitted with adequate time for review and addressing of review comments prior to factory acceptance testing: minimum of four weeks).
 - c. Sample reports, logs, and data sheets.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provision of Section 01 33 00–Submittals.
- B. Include spare parts data listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.
- C. Submit Operation and Maintenance Manuals in accordance with Division 01. The following additional information shall apply:
 1. Manuals shall contain, but not be limited to, the following:
 - a. System Hardware.
 - b. System Software.
 2. Hardware section shall include:
 - a. Safety precautions, physical description, functional description, operating procedures, theory of operation, maintenance instructions, checkout procedures, troubleshooting procedures, servicing, and removal and replacement procedures.
 - b. Wiring schematic and logic diagrams, parts list, and point-to-point wiring.
 - c. Listing of all hardware timers installed in VFD enclosures and SCADA panels, as well as the ranges set on each timer. Listing shall also include actual timer setting after completion of startup.
 3. Software section shall include:
 - a. Software manual shall describe system techniques, general philosophies, list, and description of all standard software.
 - b. Program documentation (i.e., PLCs, OIPs, and radios) shall include programs, documentation files, database and configuration as installed. Provide two USB flash drives with this information. Usernames and passwords for all programmable devices (i.e., PLCs, OIPs, and radios) shall be turned over to OWNER at the time of final completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle equipment carefully to avoid damage to SCC components, enclosure, and finish.

1.07 SYSTEM ENGINEERING

- A. System Supplier shall provide all engineering necessary to accomplish and document the requirements of this specification and be in accordance with the system configuration. The engineering to be performed by System Supplier on this project shall include, but not be limited to, the following categories:
 1. PLC system layouts.
 2. Panel layouts.

3. I/O configuration and wiring diagrams.
 4. PLC programming.
 5. Network configuration.
 6. OIP programming.
 7. HMI computer programming.
- B. Installation: CONTRACTOR shall install all system equipment, including PLCs and interconnecting cabling, as required. This work shall include all interconnection wiring from new and existing equipment as required for the completion of the system.
- C. It shall be the responsibility of System Supplier to ascertain that all field devices are compatible and consistent with the new system design. This includes reviewing drawings and data to ascertain the compatibility and consistency of the system with the field devices on such considerations as:
1. Equipment size and available space.
 2. Power levels.
 3. Power sources.
 4. Logic schemes.
 5. Signal types and levels.
 6. Interface devices where required.
 7. All other aspects of field devices impacting the design of the system.
- D. The system shall be programmed to implement the control sequences and to provide monitoring according to this specification. It shall be the responsibility of System Supplier to include all inputs and outputs required to meet all aspects of this specification, regardless of whether they are specifically included in the I/O listing in this specification.
- E. System Supplier shall provide a complete list of spare parts required and where they may be obtained for operating the system for 3 years from startup.

1.08 CONTRACTOR AND SYSTEM SUPPLIER GENERAL REQUIREMENTS

- A. This specification, along with the Contract Drawings, defines the requirements of a PLC-based process monitoring and control system. System Supplier shall construct a process monitoring and control system specifically for the demanding requirements of a real-time municipal water distribution and treatment system.
- B. It is the intent of this specification to define a fully integrated open-type process monitoring and control system, with new equipment, factory tested, delivered to the site, and ready to function upon connection of a power source and field instrument wiring. Components, peripherals, interconnections, cabling, power supplies, software, and services necessary to form a complete, integrated system shall be identified and provided by CONTRACTOR. CONTRACTOR shall submit to ENGINEER, in writing, any deficiencies noted during this review. Any changes required by CONTRACTOR because of a failure to complete this review shall be the responsibility of CONTRACTOR, at no increase in cost to OWNER.
- C. CONTRACTOR shall be responsible for complete coordination in providing all equipment, sensors, and meters supplied with input and output signals, and contacts that are compatible with the systems as specified herein. The Contract Drawings and I/O Listing are symbolic representatives of the required work. It is not intended that the Drawings show all appurtenances. CONTRACTOR shall provide a complete and working system according to the true intent and meaning of the Drawings, Specifications, and standard industry practices.

- D. To provide a complete and totally integrated system, a single manufacturer who has experience in furnishing similar networked PLC-based monitoring and control systems of the same complexity and size for municipal water distribution and treatment systems shall provide the specified equipment and services. The system proposed to meet this specification shall be of field-proven design incorporating manufacturer's standard equipment and software. Service of all peripheral devices shall be provided by the manufacturer of the process monitoring and control system.
- E. Design and specification of devices and the completed system shall conform to the applicable portions of the latest edition of the National Electrical Code (NEC).
- F. Control panels shall bear a serialized UL label indicating that it is UL approved as an assembled unit. Panels that have individual components that are UL labeled, but do not have UL approval as an assembled unit are not acceptable.
- G. Training Program:
 - 1. Submit a training plan including course syllabus, personnel who will be conducting the training, and schedule.
 - 2. Provide materials, instructors, and workbooks to complete the training.
 - 3. Training courses shall include:
 - a. Operator Training: The course shall consist of one 4-hour session at the Public Works Facility. Training shall utilize equipment specified herein following installation and field testing.
 - b. Maintenance Training: The course shall consist of one 4-hour session at the Public Works Facility.
 - 4. Manufacturer's training shall be directed to system and equipment operation, maintenance, troubleshooting, and equipment and system-related areas other than the process itself.
 - 5. Refer to Section 01 91 00—Starting of Systems for additional training requirements.
- H. System Supplier shall meet the following minimum requirements:
 - 1. System Supplier shall have a full-time staff of qualified programmers who are knowledgeable in the configuration of networked computer systems and the PLCs being provided.
 - 2. System Supplier shall have a minimum of one Microsoft-certified engineer.
 - 3. System Supplier shall have training capabilities and shall have conducted training courses in programming and maintenance.
 - 4. System Supplier shall have an adequate inventory of spare parts.
 - 5. System Supplier shall have a full-time staff of qualified service technicians.
 - 6. System Supplier shall be responsible for the programming and documentation of the system.
 - 7. System Supplier shall be responsible for all details that may be necessary to properly install, wire, adjust, and place in operation a complete and working system.
 - 8. System Supplier shall be responsible for all coordination between the system and the field devices, instrumentation equipment, VFD enclosures, and equipment furnished with other divisions of this specification. This shall include interface with existing equipment.
 - 9. System Supplier shall have a UL panel shop located inside the System Supplier's own facilities.
 - 10. System Supplier shall have experience with the specified HMI on past projects of similar size and complexity.

- I. All components shall be standard make acceptable to OWNER, with one manufacturer to provide all similar components. The Base Bid System Supplier shall be Energenecs, (262) 377-6360; Integrated Process Solutions, (608) 849-4375; or Wunderlich-Malec (952) 933-3222. See General Conditions and Supplementary Conditions regarding substitutions to the Base Bid system suppliers.

1.09 FACTORY ACCEPTANCE TESTING, SYSTEM STARTUP, AND SUPPORT SERVICES

- A. Permit ENGINEER and OWNER to observe vendor's staging records or other quality assurance records relating to system(s) supplied. System Supplier shall assemble the system components as a complete process monitoring and control system and demonstrate that the system is operational before shipment from System Supplier factory to the job site. This testing shall be as an integrated assembly by simulating each of the specified I/O points and all specified algorithms.
- B. This test shall be witnessed by OWNER and ENGINEER (two personnel). System Supplier shall provide lodging, meals, and transportation in the Bid for two days and two nights as a minimum for this witness test. Travel costs shall include all rental car fees and refueling fees for each person attending where the driving distance is less than 250 miles. Travel costs shall include all airplane travel fees for any personnel travel that would otherwise require a driving distance greater than 250 miles. ENGINEER will travel from Madison, Wisconsin, and OWNER will travel from Crest Hill, Illinois. All problems, errors, insufficiencies, and failures identified during testing shall be resolved before shipment. In the event the equipment does not operate in accordance with the specifications, programming of controllers/computers is incomplete, or setup of equipment is incomplete, there shall be deducted from payments due CONTRACTOR the amount of \$1,500 per day for ENGINEER's time plus travel and expenses, \$500 per day for OWNER's travel and expenses, as well as all costs for additional time plus travel and expenses for OWNER and ENGINEER to witness additional factory acceptance testing.
- C. In order to allow remote participation in the Factory Acceptance Test, System Supplier shall make provisions to allow ENGINEER and OWNER to connect to the temporary PLC network in their factory using a high speed (minimum 30 mbps) Virtual Private Network (VPN). The VPN connection shall allow full network access to all PLCs, SCADA computers, and any other equipment needed to fully complete the factory acceptance testing. The VPN shall be activated and the latest version of VPN Client software shall be provided to OWNER and ENGINEER at least one week prior to the scheduled test to allow for VPN connection testing and troubleshooting. This VPN connection is in addition to the in-person factory acceptance testing specified above.
- D. On-Site Functional Acceptance Testing:
 1. After all equipment has been installed and is placed in full-time operation or after all equipment associated with the group of equipment scheduled for on-site functional acceptance testing has been installed and placed in full-time operation, CONTRACTOR and System Supplier shall demonstrate that all equipment and controls operate in compliance with the Contract Documents. For each piece of equipment being tested, all systems associated with the operation of the equipment (e.g., controls, supply/discharge piping, etc.) shall be installed and be in full operating condition so that all equipment functions are able to be completely tested without delay using real-time process I/O.
 2. All control wiring, hardwired interlocks, HMI and OIP screens, control programming, etc., shall be checked out and functionally tested by System Supplier prior to ENGINEER's

- on-site functional acceptance testing. All functional errors shall be corrected prior to ENGINEER's on-site functional acceptance testing.
3. CONTRACTOR shall submit updated versions of all HMI and OIP screens developed by this System Supplier to ENGINEER for review at least one month prior to the functional acceptance testing of equipment controlled through the associated HMI and OIP screens.
 4. Coordination Videoconferences:
 - a. CONTRACTOR shall schedule and conduct an initial functional acceptance testing coordination videoconference at least two months prior to the anticipated functional acceptance testing. The videoconference shall include CONTRACTOR, System Supplier, Division 26 contractor, OWNER, and ENGINEER, and all other parties responsible for the equipment and controls scheduled for functional acceptance testing.
 - b. CONTRACTOR shall schedule and conduct additional functional acceptance testing coordination videoconferences one month prior to the date for functional acceptance testing of each group of equipment to confirm status of equipment installation and System Supplier checkouts, and updates to the functional acceptance testing schedule, after which ENGINEER will finalize reservations for travel and accommodations. All parties shall agree on a date for functional acceptance testing of the next group of equipment at this videoconference, or schedule an additional videoconference to establish a testing date one month prior to the delayed testing date. If the functional acceptance testing is rescheduled within one month of the agreed upon date, there will be deducted from payments due to CONTRACTOR the amount of penalties paid by ENGINEER for travel and accommodation cancellations. OWNER will deduct the amount of these charges from payments made to CONTRACTOR.
 - c. CONTRACTOR shall provide the following information in written form at each videoconference. All information shall be updated prior to each videoconference.
 - (1) Equipment installation and manufacturer's startup schedule.
 - (2) Status of all power and control system wiring for the equipment scheduled for functional acceptance testing.
 - (3) Schedule and status of System Supplier's on-site checkout and functional testing.
 - (4) Anticipated delays and the cause of each delay.
 - (5) Conflicts with OWNER's operation of the facility.
 - (6) Proposed dates for acceptance testing of all equipment and controls.
 - (7) Proposed dates for future acceptance testing coordination videoconferences.
 5. After being notified by CONTRACTOR that the equipment has been installed and is in full operating condition and ready for ENGINEER's functional acceptance testing, ENGINEER will make one one-day trip to check operation. If Bid Alternative No. 1 is accepted, a second two-day trip shall be included. CONTRACTOR and System Supplier shall be on-site during testing to adjust equipment, correct erroneous wiring, and make modifications to control system, as necessary. If the equipment and controls do not operate according to the Contract Documents, or if CONTRACTOR and System Supplier are not present during the scheduled testing, there will be deducted from payments due to CONTRACTOR the amount of \$1,500 a day for ENGINEER's time plus travel and expenses, and for all additional field and office time spent by ENGINEER checking equipment. OWNER will deduct the amount of these charges from payments made to CONTRACTOR.
 6. System Supplier shall provide functional acceptance testing support through one or more on-site field service engineers and the project control system programmer. Time for the on-site field service engineers and programmer scheduled for functional

acceptance testing shall be dedicated to the functional acceptance testing process and shall not be interrupted for other construction-related activities.

- E. Final acceptance and payment will not be made until the system has operated satisfactorily for a minimum of 30 consecutive days. CONTRACTOR shall include in the Bid field follow-up to provide proper adjustments and operation during the first year following project final completion. Prior to beginning the 30-day test, the following criteria shall be met:
 - 1. Satisfactory operation of I/O control loops.
 - 2. Satisfactory operation of software.
 - 3. Satisfactory operation of control program.
 - 4. Satisfactory operation of peripheral equipment.
 - 5. The necessary debugging programs have been performed.
 - 6. Data output is reliable.
 - 7. Control loops are operational.
 - 8. Checking and calibrating of systems have been completed.
 - 9. Wired and wireless communication systems are reliable.
- F. CONTRACTOR, through System Supplier, shall provide the following support services:
 - 1. Field Service Engineer: Field service engineer shall be responsible for programming of system PLCs in the factory and at the site. Field service engineer shall be present at the factory acceptance test and be present for startup of all systems and available throughout the entire construction process until final completion. Service technicians sent for system startup will not be acceptable. Support shall include on-site time. Services shall include, but not be limited to:
 - a. Commissioning, installation, startup, and testing of equipment.
 - b. Revising or rewriting manuals to incorporate an installed and accepted system.
 - c. On-site training.
 - d. Software modifications.
 - 2. In-factory support shall include consultation following the acceptance testing and shipment. Services shall include, but not be limited to:
 - a. Researching and answering questions related to the system operation, documentation, and system use and functions.
 - b. Program modifications.
 - c. Revising or rewriting manuals.
 - 3. Post-startup support shall include follow-up services during the one-year period following final acceptance. Service shall include follow-up recalibration and replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include 40 hours for work on-site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve the operation of the system. In addition to the 40 hours, include two trips to the site.
 - 4. If Bid Alternative No. 1 is selected, provide an additional 40 hours of enhancement time and one additional trip to the site.
- G. CONTRACTOR shall not install any hardware or software to enable remote access or control without written permission from OWNER and ENGINEER.

1.10 COMMON REQUIREMENTS ALL EQUIPMENT

- A. All indicating and recording devices shall be electric or electronic.
- B. All indicating and control devices mounted on control panel and standalone VFD enclosure doors (e.g., meters, gauges, electronic indicators, pilot lights, selector switches, VFD

HIMs, etc.) shall be located at eye level, minimum 48 inches, maximum 60 inches, from floor to bottom of device.

- C. All motor control power shall be 120 volts with suitable circuit protection (fuses or breakers). Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown.
- D. Devices powered at 120 volts from supervisory control panels shall be fused. This shall include, but not be limited to, solenoid valves, motor-operated valves, motorized ball valves, flowmeters, scales, and transmitters.
- E. Provide lightning protection, isolation transformers, and fused disconnects at each end of each power circuit, supervisory circuit, and local supervisory circuit with transformers and relays, if necessary, to obtain supervisory power. 120-volt power shall be available at all control points. Lightning protection shall be completely solid-state and self-healing and shall not require the use of fuses. Provide a single switch with an indicating light to deenergize the control power for each location. Each panel shall have a GFI, duplex, 15 ampere, 120-volt receptacle.
- F. If enclosure and back panel space is specified to be provided for the installation of future equipment, the enclosure and back panel shall be constructed to accommodate all future equipment. Supports and wireway shall be provided for future equipment, and openings in the enclosure shall be provided for future pilot devices and covered with neat cover plates matching the finish of the enclosure.
- G. Where equipment is necessary to perform a function as called for in one part of this specification, it shall be provided, even though the detailed enumeration at various control points may omit listing that equipment.
- H. Where a certain accuracy of sensing and transmitting levels, flows, or other process conditions and controlling operations are called for, means shall be provided to read or determine that the process conditions are within the limits or accuracy specified for the sensing, transmitting, and controlling devices. Where no accuracy is specified, but a knowledge of process conditions is necessary to set operating points, provide accuracy consistent with the requirements for operation of the system.
- I. All control and auxiliary relays shall have indicating LEDs. All timing relays shall have On and timing Out LEDs.
- J. Status signals for motors powered from VFDs and associated equipment, noted in the Section 26 09 90–SCADA System I/O Listing to be communicated to the associated PLC via Ethernet shall be wired to inputs on the VFD and communicated to/from the PLC via the SCADA System EtherNet/IP network.
- K. Hardwired Motor Controls:
 - 1. Equipment and wiring specified to be hardwired shall be physically wired independent of controllers, programmable relays, and communication systems to allow manual operation in the event of an emergency.
 - 2. Motor control wiring and logic shall be set up such that in the event of a power failure, equipment shall automatically restart if previously running, or remain off if previously off. A manual reset shall not be required to restart equipment following a power failure.
 - 3. All hardwired local controls for VFDs shall be fully functional in the event of an Ethernet communication failure between the VFD and the PLC.

1.11 GENERAL CONTROL ALGORITHMS

- A. In general, the following is a definition of I/O at each VFD enclosure:
1. Run from VFD auxiliary contact (dry contact or Ethernet).
 2. Fail from VFD auxiliary contact (dry contact or Ethernet).
 3. Start/Stop maintained signal to VFD, or as required (dry contact or Ethernet).
 4. In Auto/In Remote from selector switch on motor controller (dry contact or Ethernet).
 5. Any command to operate shall be acted upon within 5 seconds, and any status feedback signals shall be received within 5 seconds.
- B. Definitions:
1. The "Master Telemetry PLC" for the SCADA System is currently located at the Public Works Facility and shall be relocated to the East Receiving Station. This PLC shall send and receive information to and from all remote PLCs connected to this PLC via radio telemetry, and shall make this information available to other networked PLCs and available for display at the SCADA System. The PLC logic common to all Remote Telemetry-Connected PLCs shall reside in the Master Telemetry PLC including, but not limited to, the daily totalizer reset time, PLC time and date settings, and software alarm dialer communication fail monitoring, hardware alarm dialer activation, Remote Telemetry-Connected PLC communication fail monitoring, and intrusion system control and monitoring.
 2. Where referenced herein, a "Remote Telemetry-Connected PLC" includes any PLC located at a facility remote from the Master Telemetry PLC location that communicates information back to the SCADA System via the Master Telemetry PLC via radio communications.
- C. Programming algorithms described herein and in Part 3—Execution shall reside within the PLC associated with that equipment and not in the Master Telemetry PLC. Polling sequences for data transmission over radio telemetry shall be set-up to poll remote data based on the data type (e.g., alarms, historical) so that data transmission rates are not adversely affected.
- D. All alarm contacts or system changes following a command must exist or not change for 0 to 5 seconds to activate an alarm at the SCADA System.
- E. All analog and digital inputs shall be monitored in the PLC. This shall include, but not be limited to, flows (water, etc.), pressures, electrical values, and levels. The following analog signals shall have minimum, maximum, and running average calculated values: all flows, kilowatts, levels, temperatures, and pressures. Instantaneous values, totals, maximum, minimum, and average values shall be read by the HMI software and be reset on a daily basis as described below. Minimum, maximum, and average values shall be stored in the PLC for the current day and previous day.
- F. PLCs shall calculate equipment runtimes and number of starts for all equipment where run signals are monitored. Runtimes and number of starts shall be read by the HMI software and be reset on a daily basis as described below.
- G. Totalized flow values, chemical usage, electrical values (kilowatt-hours), and equipment runtimes as described above shall be stored in the PLC for a period of 7 days. This data shall be available for use by the HMI software for importing into a reporting software package for purposes of daily, weekly, and monthly reporting. The PLC shall indicate the specific date for each of the 7 previous days.

- H. Calculations for chemical usages shall be programmed so that tank filling cycles do not affect the usage totals. The totalizer shall only accumulate chemical usage when any pumps served by the tank are running. Provide a hardcoded tank-filling deadband to determine when the tank is being filled. When the tank level increases more than the deadband (i.e., the tank is being filled), chemical usage totalizing shall be suspended until the tank level stops rising for a hardcoded time delay (i.e., the tank is no longer being filled). The daily usage total shall be reset with the daily flow and runtime totals. Coordinate the hardcoded buffer and time delay values described above with OWNER during startup.
- I. Daily flow totals, chemical usage, runtimes, number of starts, and electrical values (kilowatt-hours) as described above shall be reset on a daily basis. This reset shall occur based on a time (hour and minute) setpoint stored in the Master Telemetry PLC through the HMI software and shall be automatically communicated to all Remote Telemetry-Connected PLCs so that each PLC will reset daily totals for its associated equipment even if there is a loss of communication with the Master Telemetry PLC. The operator shall set the time when the daily reset will occur. Once this time setpoint matches the current time of the processor clock, each PLC shall clear any totals that have accumulated locally.
- J. In addition to the totalizers described above, the PLC shall also calculate cumulative totals for all runtimes, number of starts, flows, electrical values (kilowatt-hours), and chemical usage. Maximum, minimum, and running average for all analog inputs shall also be included as part of the cumulative total algorithm. Cumulative totals shall totalize until manually reset by the operator. The reset tag within the PLC shall be set by the operator at the HMI software and reset by the PLC. There shall be a manual reset for each signal. The PLC shall display the date of the last cumulative totalizer reset for each signal.
- K. Indication of time remaining for all timers (hardcoded and operator adjustable) within PLCs shall be made available for indication at the SCADA System.
- L. The operator shall be able to set the processor clock and processor date in the Master Telemetry PLC from the HMI software. The clock and date setting shall be transmitted from the Master Telemetry PLC to all Remote Telemetry-Connected PLCs based on the setting in the Master Telemetry PLC.
- M. All analog signals shall be scaled to engineering units in the PLC with real or floating-point data types to prevent scaling values in the HMI. System Supplier shall provide all analog ranges and PLC register/tag addresses, and any implied decimal scaling factors to ENGINEER for use with the HMI software. This shall include upper and lower limits for the associated device (i.e., 0 to 150 psi).
- N. For all analog input signals to the PLC I/O cards, provide a Transmitter Fail alarm at the SCADA System for each transmitter. Transmitter fail shall be defined as the signal from the transmitter being out of range.
- O. The following analog signals shall have associated high and low setpoints and alarms: All levels, pressures, etc., and amps (high only). Provide a "Reorder Chemical" level setpoint for all bulk chemical storage tank level analog signals. Provide a "Refill" level setpoint for all chemical day tank level analog signals.
- P. PLCs shall be set up so that the ranges of all analog input signals to the PLC I/O cards can be configured from the HMI software. Provide two operator-adjustable setpoints for each analog input, one corresponding to 4 mA and the other corresponding to 20 mA. These setpoints are applicable to devices attached to the Remote Telemetry-Connected PLCs (via

the Master Telemetry PLC). This feature is intended to be used for startup and calibration purposes.

- Q. All equipment controlled automatically from the SCADA System shall have "Call-to-Run" signals generated from their associated PLCs. These signals shall be displayed at the SCADA System through the HMI software. Each associated PLC shall also generate a Call-to-Run Fail alarm if the equipment is called-to-run but does not start within a specific time period. The Call-to-Run Fail alarm shall be generated within the PLC software and may not be combined with other fail signals such as hardwired motor fails, and overtemperature. Call-to-Run Fail alarms shall only be active when the selector switch on the motor controller is in the "Auto" position.
- R. In cases where the automatic alternation of equipment is provided by the PLC, indication of the lead, lag, and lag-lag pumps (where applicable) shall be made available for display at the SCADA System.
- S. All controlled equipment as described herein shall have the capability of manual control from the HMI software through the manipulation of analog or digital variables. This shall be through the use of a "SCADA H-O-A" switch or by forcing a single I/O point as a manual start command. All analog and digital outputs shall be capable of being manually set from the HMI software.
- T. Where a manual reset is required at the SCADA System (i.e., level lockout, pressure lockout), the HMI software shall be configured to set a discrete reset bit. Once the PLC receives the bit and the alarm condition has cleared, the PLC shall clear the alarm and place the associated equipment back in service.
- U. The SCADA System shall allow the operator to change all setpoints and operating parameters within the PLCs as described herein. All control algorithms and alarms for equipment shall be programmed in the associated PLC and not in the Master Telemetry PLC. There shall be no control algorithms or alarms in the SCADA computers. Control of each piece of equipment shall be accomplished as described herein and in Part 3—Execution of this section.
- V. Each Master Telemetry PLC shall be set up so that this PLC monitors the cycle of each Remote Telemetry-Connected PLC to detect a communication failure. This shall be accomplished by the Master Telemetry PLC setting and resetting a bit internal to the Master Telemetry PLC program every 60 seconds. This bit shall then be sent to each Remote Telemetry-Connected PLC. Once this bit is received by the Remote Telemetry-Connected PLC, the PLC shall copy the value of this bit to a second bit internal to its PLC program. This second bit shall be read by the Master Telemetry PLC. If the Master Telemetry PLC does not see a change in status of the second bit, a PLC communication fail alarm shall be activated at the SCADA System. The Master Telemetry PLC shall provide indication of which PLC is in alarm at the SCADA System.
- W. Radios installed in telemetry panels for Remote Telemetry-Connected PLCs and for the Master Telemetry PLC shall be powered through a normally closed control power relay contact. If a Remote Telemetry-Connected PLC detects a communication fail or if the Master Telemetry PLC detects a communication fail with all associated Remote Telemetry-Connected PLCs, the PLC shall energize the control power relay that will deenergize power to the radio. The relay shall be energized for 5 seconds and then deenergized. Communication fail time delays shall be adjusted during startup based on the

quantity of telemetry panels. One additional radio power cycle shall be attempted if the first power cycle does not restore communications.

- X. The Master Telemetry PLC shall log the following connection data with each Remote Telemetry-Connected PLC and make it available for display at the SCADA System. The data shall be reset daily using the same daily reset timer used for other SCADA System daily totalizers.
 - 1. Connection attempts.
 - 2. Successful connections.
 - 3. Failed connections.
 - 4. Success rate (%).
 - 5. Duration (seconds) of the previous complete polling sequence for each polling sequence.
- Y. Each alarm shall have a discrete PLC tag that is able to be toggled at the SCADA System HMI to enable or disable the associated alarm from being activated.
- Z. Alarm functions shall be capable of being printed out listing both time and date of their occurrence, as well as acknowledgment, the operator that acknowledged the alarm, and the current state of the alarm. Any change in alarm state shall also be capable of being printed. These alarms shall list both station and type of alarm that has occurred. Again, based on demand, a log or record of 24-hour/30-day records shall be kept and stored both by hard copy as well as hard disk or USB drive. All alarm points shown on the I/O list, as well as those developed in PLC software, shall each be indicated individually at the SCADA System (i.e., no common alarms).
- AA. In the event of a power failure, when power is restored, the PLC shall automatically stagger the restart of any controlled equipment that is being called to run by the PLC. The stagger shall be operator-adjustable from 0 to 300 seconds through the HMI graphics software on the SCADA computers.
- BB. Provide a hardcoded minimum speed within the associated PLC for each pump operating on a VFD. The minimum speed shall be the minimum speed at which the pump will still produce flow. Coordinate the minimum speed with the pump manufacturer during startup.

1.12 SPARE PARTS (BID ALTERNATIVE NO. 1)

- A. The following shall be furnished by Section 26 09 00—Controls and Instrumentation System Supplier:
 - 1. 10% of PLC communication cards, minimum of one each.
 - 2. One radio and antenna for each type provided.
 - 3. One PLC processor and PLC power supply for each type provided.
 - 4. 10% of PLC input/output cards for each type provided (analog and discrete), minimum one each.
 - 5. Two control panel surge suppressors for each type provided.
 - 6. One network switch. Spare shall match the largest port capacity switch provided for the project.

1.13 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with

GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.14 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 SCADA SYSTEM COMPUTERS AND SOFTWARE

- A. All components of the computers shall be supplied by System Supplier, and all software shall be configured as described herein and in Part 3—Execution. The computers shall perform the following:
 - 1. Process monitoring of system analog and digital signals.
 - 2. Report generation.
 - 3. Historical logging of measured operating data.
 - 4. Monitoring and operating status of metering equipment and trending of irregular performance.
 - 5. Active color graphic display capabilities.
 - 6. Operator interface to provide easy access for operating personnel to system.
 - 7. Provide flexibility of changing system operating modes with minimal amount of system reconfiguration.
 - 8. Data acquisition.
 - 9. Expansion of main memory to accommodate the specified increase in I/O with the additional capability specified herein.
 - 10. Equipment status and alarm reporting.
- B. System Supplier shall include an allowance of \$15,000 in the Lump Sum Base Bid for three desktop computers, one firewall, and software (allowance does not include HMI Software and Computer Software described below. These items shall be included in the Bid). System Supplier shall include in the Lump Sum Base Bid (not part of the allowance) all labor necessary to set up the three desktop computers, firewall, and software as described herein and shown on the Drawings. Purchase of computer hardware and software shall be held until approved by ENGINEER so that the system is of current technology at project completion. CONTRACTOR shall not use any computer hardware or software supplied as part of the Contract. Final selection of each system's components shall be made at the time of actual purchase based on latest available technologies. Final cost for this equipment will be adjusted by change order based on actual system costs.

- C. Each SCADA computer shall operate on a network platform that allows simultaneous operation of several units without loss of data. It is the intent of this specification to provide Programmable Logic Controllers (PLCs) for operating and monitoring the system. The SCADA computers will interface with a centralized SCADA System for process monitoring and report generation. The system shall be a PLC-based polling system whereby each remote will be monitored on a cycling basis.
- D. The computer hardware shall be installed where shown on the Drawings and herein specified complete with all power cabling and interface cabling. Provide APC, or equal, four-port surge protector for each computer. Surge protectors shall include protection for one telephone line. Provide a true on-line UPS for each computer that will provide 30 minutes of operation during a power failure. UPSs shall match those being provided for the PLCs specified herein.
- E. Computer Software:
 - 1. The following software shall be provided with each desktop computer (unless otherwise noted). Provide service and support for the following software throughout construction and for 1 full year after project final completion. Service and support shall include software version upgrades and service packs. All software shall include manuals, license, and registration cards:
 - 2. Ultra VNC Server and viewer, latest versions. Copies shall be provided as specified below in the SCADA Computer Software Schedule.
 - 3. Veeam Agent and Console licenses as required. Copies shall be provided as specified below in the SCADA Computer Software Schedule.
 - 4. SCADA HMI Software:
 - a. HMI Software shall be provided for the SCADA computers including all documentation and licenses. The SCADA software shall be licensed using software license files that can be easily restored to the system in case of hard drive failure. System Supplier shall provide coordination for addressing system I/O that includes a listing of addresses for each I/O point described as being manipulated or monitored by the operator through the SCADA System for each SCC. System Supplier shall refer to Paragraph 1.11–General Control Algorithms, Part 3–Execution, and Section 26 09 90–SCADA System I/O Listing for minimum requirements. Listing shall be provided as hard copy and in Microsoft Excel spreadsheet file on a USB flash drive with project-specific label.
 - b. The software shall be Windows-based with an object-oriented graphics development environment and have an open architecture that utilizes the latest in Windows 11 Professional client/server networking technology from Microsoft.
 - c. The software shall have the ability to filter, scale, and otherwise condition raw PLC data. These functions, plus the ability to generate alarms on raw PLC data, must operate independently from any other subsystem.
 - d. The formatting of alarm and event displays shall be fully configurable including the amount of information shown in an alarm/event window. The software shall have the ability to filter and/or query alarms based on user-defined alarm groups.
 - e. The operator display system shall include advanced user interface devices including list boxes, radio buttons, and sliders. These devices shall be an integral part of the product's standard library of objects accessible from the interface builder. The library shall be capable of being added to with user-developed objects.
 - f. The product shall support Microsoft OLE, OPC, and ODBC for communications with report generation database software.
 - g. The software shall be configured to take advantage of the built-in networking capabilities of the computer operating systems. The SCADA servers shall be directly

connected to the SCADA System PLC network and shall communicate directly with Networked PLCs and communicate directly with the Master Telemetry PLC to send and collect information to and from all Remote Telemetry-Connected PLCs. All other machines shall use the networking functions to access and manipulate the data residing on the SCADA server without storing their own copies of that data. This will allow each machine on the network to acknowledge system alarms, monitor equipment states, and modify setpoints. The network protocol shall be TCP/IP.

- h. The HMI software shall be InTouch by Wonderware. Refer to the SCADA Computer Software Schedule below for specific software required on each computer. I/O drivers shall utilize OPC or DDE. Computers with I/O drivers shall be redundant nodes so that runtime nodes will have the capability of receiving data from either I/O Server. Runtime clients shall have full read/write access to the applications including, but not limited to, changing setpoints and acknowledging alarms. All desktop computers shall have ODBC interface capabilities. Runtime nodes shall be set up to receive data from either I/O server so that if one fails, the other will automatically provide data to that node.
- i. Provide comprehensive service and support for all HMI software throughout construction and for 1 full year after project final completion. Service and support shall include version upgrades and service packs.
- j. The HMI software shall not be purchased until approved by ENGINEER or the computer hardware is released for purchase. See item B. above.
- k. The software shall include an integral security system that will enable various operator tasks based on the user level and password. Access to all displays and to all command functions shall be based on the operator's security level to protect against unauthorized use. After initial creation, only an assigned user with proper authorization or the system administrator shall modify the password.

TABLE 2.01

SCADA COMPUTER SOFTWARE SCHEDULE

Software	SCADA1 (Desktop)	SCADA2 (Desktop)	BACKUP (Desktop)
InTouch 100 k Runtime*	☒ **	☒	☐
I/O Driver	☒	☒	☐
Ultra VNC Personal (Server)	☒	☒	☒
Ultra VNC Personal (Viewer)	☒	☒	☐
Veeam-Agent	☒	☒	☐
Veeam-Console			☒
XL Reporter	☒ **	☐	☐
Software Dialer	☒ **		
Microsoft Office Professional (Latest Version)	☒	☒	☐

*Provide retail Wonderware licenses. OEM licenses are not allowed.

**Upgrade existing license, Serial No. 2356078.

F. Engineering:

1. System Supplier shall provide all engineering necessary to accomplish and document a system that meets these specifications and is in accordance with the system

configuration. The engineering to be performed by System Supplier on this project shall include, but not be limited to, the following categories:

- a. System layouts.
- b. Control panel layouts.
- c. Input/output (I/O) configuration and wiring diagrams.
- d. Programming of PLCs and coordination of addressing with HMI Programming. Coordination shall include address grouping to allow group transfers to the HMI Software.
- e. Fiber-optic data highway layout.
- f. Network layout.
- g. Radio communications layout.
2. Submittals: In addition to submittals previously described, provide:
 - a. Shop Drawing and Product Data.
 - b. Logic Programs.
 - c. Recommended Spare Parts Lists.
3. Installation: CONTRACTOR shall install all system equipment including, but not limited to, all local I/O enclosures, remote I/O enclosures, and interconnecting cabling. This work shall include all interconnections and wiring from new and existing equipment for completion of the system.

2.02 EQUIPMENT ENCLOSURES

- A. New enclosures shall be front access only, minimum No. 14 gauge steel, with continuously-hinged doors. Enclosures equal to or smaller than 24 inches wide by 24 inches high shall be equipped with at least two quarter turn latches. Enclosures larger than 24 inches in any dimension shall be equipped with 3-point latch with top and bottom bolts actuated by one rotating, lockable handle on each door. Provide a door stop kit for each door, data pocket for wiring diagrams, and minimum 12-inch, bolt-on, LED light and door switch. Panels over 48 inches wide shall have two lights. Painting shall include phosphate treatment, zinc chromate iron oxide primer, baked rust-inhibiting enamel, and white interior. All doors and panels shall be gasketed. All louvers shall be filtered and forced-air cooling shall be provided as necessary for conditions where installed. Provide enclosure dimensions as specified herein. Enclosures shall be as manufactured by Hoffman or Saginaw. MCC structures are not acceptable.
- B. Each PLC enclosure shall include, but not be limited to, the following equipment:
 1. PLC, I/O modules, and communication modules.
 2. Power supplies.
 3. Surge protective devices.
 4. DIN-rail mounted terminal blocks for field wiring terminations.
 5. Plastic wiring ducts.
 6. General purpose 15-amp, 120-volt AC duplex GFCI receptacle.
 7. 20-amp, 120-volt AC main circuit breaker and branch circuit breakers as required to feed the PLC and the I/O controlled field devices.
 8. Other accessories required to provide a complete and working PLC system.
 9. UPS backup for the SCADA panel.
 10. Fiber-optic patch panel where shown on the Drawings.
 11. Network switch.
 12. Front panel-mounted programming port with RJ-45 jack and 120-volt receptacle.
- C. The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.

- D. Refer to Section 26 05 53–Electrical Identification for the control panel and field wiring color code.
- E. 24 VDC power supplies shall be provided in the enclosures to power all 24 VDC devices and loop-powered analog input signals, where required.
- F. NEMA ratings of enclosures shall be as required for the area where installed, unless specified otherwise.
- G. Manufacturer of Accessories:
 - 1. Plastic wiring duct shall be Panduit Panduct, or equal.
 - 2. Terminal blocks shall meet the requirements of Section 26 05 19–Wire.
 - 3. Wire markers shall meet the requirements of Section 26 05 53–Electrical Identification.
 - 4. Circuit breakers shall be Square D Type QO with mounting bases, or equal. Circuit breakers can be rail-mounted type, Square D, Class 9080, Type GCB-150, or equal.
 - 5. Signal conditioners shall be Action Instruments, DIN rail mount, or equal.
 - 6. Power supplies shall be Allen-Bradley Model 1606-XLS, or equal, and shall meet the following requirements:
 - a. Sized for the connected load plus inrush with capacity for a 50% power boost for up to 5 seconds.
 - b. Integral, dry-contact relay for monitoring "DC OK" status at the SCADA System.
 - c. UL Listed.
 - d. Conformal coated.
 - e. Temperature Range: -25°C to 60°C.
 - f. Protection Features:
 - (1) Over-voltage protection.
 - (2) Protection against no-load and short circuit conditions.
 - (3) Over-temperature protection.
 - (4) Internal input fuse.
 - (5) MOV-type input transient protection.
- H. All wiring within the enclosure shall be through plastic wiring troughs. Plastic wiring troughs shall have removable covers. Maximum fill for wiring troughs shall be 60%. All wiring in supervisory enclosures and control panels not in wiring troughs shall be bound with continuous-type spiral windings. Terminal strips located adjacent to wiring troughs shall have a minimum of 1 1/2 inches between terminal strip and wiring trough. All wiring labels shall be able to be read without removing wiring trough covers. Wiring troughs shall be provided for all field wiring.
- I. All wiring for new panels shall be done in the factory, Class II, Type C with master terminal strips for exterior connections. Terminal strips shall be located either at the bottom or on the side of the enclosure, depending on where the I/O conduits penetrate the enclosure. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation, and if enclosures are shipped in sections, all wiring and connections between sections shall be done by CONTRACTOR. The field wiring terminals shall be clearly identified as to which I/O terminals they are wired. Jumpers between adjacent terminal blocks shall be copper jumper bars supplied by the terminal block manufacturer. All wiring shall be labeled at each end with corresponding numbers matching the associated terminal block. This numbering shall be shown on the shop and Record Drawings.
- J. All door-mounted devices shall be furnished flush-mounted, and an exterior-engraved phenolic nameplate worded by OWNER (upon receipt of shop drawings) shall be provided

for each component, device, and light. All components within the enclosures shall be identified with sticky-back adhesive, self-laminating, machine-printed marking labels with white background and black text; minimum size 12 font. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.

- K. All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.
- L. In addition to spare I/O specified herein, provide a minimum of 25% spare hot and neutral terminals wired to terminal strips. Spares shall be provided for all voltage sources within the panel (e.g., 120 V, 24 V).
- M. Enclosures that include motor controllers shall have a main disconnect for the enclosure.

2.03 PLC REMOTE TELEMETRY SYSTEMS

- A. All control signals, status signals, alarm, and variable analog data shall be transmitted and received between the Master Telemetry PLC (SCC-Main) and the Remote Telemetry-Connected PLCs via a SCADA System using digital telemetry. The mode of communication for the PLCs shall be via radios as specified herein. The SCADA System shall convert commands, alarms, and variable analog data to digital data blocks and transmit this information between a master and the multiple remote sites.
- B. The digital blocks of data shall be sent/received in half-duplex mode from the Telemetry system to the PLCs via the serial interface.
- C. If communications cannot be verified between the Master Telemetry PLC and a Remote Telemetry-Connected PLC, the Master Telemetry PLC shall try to send the data three times before a data fail output is energized.
- D. The system shall communicate at a rate sufficient to perform any command to operate control within 5 seconds and receive any status feedback signals within 5 seconds.
- E. The Master Telemetry PLC shall normally sequentially poll all the Remote Telemetry-Connected PLCs, but shall be field-programmable to alternate sequences to minimize the update time for critical remotes. Provisions shall be included to field-program a time delay between PLC interrogations and between scan sequences.

2.04 COMPACTLOGIX PROGRAMMABLE LOGIC CONTROLLERS

- A. Construction:
 - 1. The PLC shall include a CPU, memory, embedded dual Ethernet ports, and embedded energy storage.
 - 2. The PLC and all system modules shall be DIN rail mounted.
 - 3. All system modules shall be able to operate in an industrial environment with an ambient temperature of 32°F to 140°F.
 - 4. All system modules shall be able to operate in a free airflow environment.
 - 5. All system modules shall be able to operate in high electrical noise environments.

- B. The system shall support a minimum of eight local I/O expansion modules in up to three chassis.
 - 1. Local expansion modules shall be installed in the local chassis or in chassis adjacent to the local chassis.
 - 2. The manufacturer shall have available a variety of I/O modules, including, but not limited to, AC or DC discrete input, AC or DC relay contact output, 4-20 mA analog input and output, and RTD.
 - 3. Each chassis in multiple-chassis installations shall be interconnected via Ethernet.
 - 4. Discrete I/O cards shall be 120 VAC 16 point maximum, unless otherwise noted.
 - 5. Isolated discrete I/O cards shall be 8 point maximum. Isolated discrete cards shall be used if there are multiple or external power sources associated with the signals, if wiring leaves the building, or if the card is driving a load (i.e., solenoids, etc.).
 - 6. Analog input cards shall be 8 point.
 - 7. Analog output cards shall be 4 point isolated type.
- C. CPU:
 - 1. The CPU shall be a self-contained unit, and shall be capable of providing control program execution, supporting remote and local programming, controlling all I/O scanning and inter-controller and peripheral communication and diagnostic functions as follows:
 - a. 32 tasks (1,000 programs per task):
 - (1) Continuous—one allowed.
 - (2) Periodic—Run via an interrupt at a user-defined interval in 1 μ s increments from 1 ms to 2000 s.
 - (3) Event—Triggered by consumed tag or EVENT instruction.
 - b. 256 controller connections.
 - c. Network connections:
 - (1) Up to 256 EtherNet/IP.
 - (2) Up to 120 TCP/IP.
 - 2. The PLC shall organize user applications as tasks, which can be specified as continuous, periodic, or event based. Tasks shall be triggered by input point or instruction.
 - 3. The CPU shall have a real-time clock.
 - 4. When the main power supply is removed, the CPU shall have the ability to back up user program and all data, or a nonenergy storage option.
 - 5. The front of the CPU shall have a USB port.
 - 6. The front of the CPU shall have an integrated latching mechanism for securing the secure digital (SD) memory card. The PLC shall operate with the memory card removed.
 - 7. The processor module shall have LED indicators to indicate CPU status.
 - 8. The processor module shall have a mode switch.
- D. Memory:
 - 1. The PLC shall have a minimum of 2 MB of standard user memory. Provide processor configurations with additional memory as required.
 - 2. The program storage medium shall be solid-state, nonvolatile type.
 - 3. The PLC shall include a 2 GB SD memory card to store the user program and the firmware of all modules residing in the same chassis to protect against memory loss.
- E. Programming Environment:
 - 1. Programming shall be through the USB 2.0 port or through the EtherNet/IP network.
 - 2. The programming software shall run on the latest version of Windows and the programming methods shall be:
 - a. IEC 61131-3 compliant ladder diagram.

- b. Structured text.
 - c. Function block diagram.
 - d. Sequential function chart.
- F. Communication:
 - 1. USB 2.0 port to support upload and download, online edits, firmware updates, and bridging to other modules.
 - 2. EtherNet/IP switch and dual 10/100/1000 Mbps EtherNet/IP ports with unique IP addresses or a single IP address when connected as part of a device level ring. The interface shall support:
 - a. IEEE 802.3 Physical and Data Link Standard.
 - b. Common Industrial Protocol (CIP), the protocol that provides real-time I/O messaging and information/peer-to-peer messaging.
 - c. Standard TCP/IP and UDP/IP communication.
 - d. 10/100/1000 Mbps auto sensing and auto switching.
 - e. Standard Ethernet media.
 - f. Subnet masking.
 - g. BOOTP and DHCP support.
 - h. Manual configuration using specified software.
 - i. Programmable Logic Controller messaging to peer controllers and workstations.
 - j. I/O data, real-time interlocking and information.
 - k. Full- and half-duplex communication.
 - l. Serial communication.
 - m. Built-in web access to diagnostics.
 - n. I/O control.
 - o. Precision Time Protocol (CIP Sync, IEEE 1588).
- G. Power Supply:
 - 1. The PLC shall be provided with separate, dedicated, field-side power supplies, quantity as needed, for sensor/actuator (SA) power, and a separate, dedicated, system-side power supply for power to the PLC and I/O modules (MOD) power.
 - 2. Provide field-potential-distributor modules as needed to transition SA power from AC to DC or from DC to AC input power for downstream I/O modules.
- H. PLCs shall be as manufactured by Rockwell Automation, CompactLogix 5380 L3 Series, or equal.
- I. PLC Programming and PLC Software: System Supplier shall provide all PLC programming and software required to meet this specification. The software shall include, but not be limited to, the following:
 - 1. PLC logic programs to be written by System Supplier for the PLC systems to accomplish the monitoring and control functions as specified herein. The System Supplier shall document and annotate the programs, update them as required after startup, and then turn two copies of the programs over to OWNER on two USB flash drives with project-specific labels.
 - 2. All I/O addressing that is to be viewed or manipulated by the HMI software shall be organized into contiguous blocks of integer tags for discrete bits and floating point tags for all other values to facilitate block data transfer between computers and PLCs.

2.05 UNINTERRUPTIBLE POWER SUPPLIES

- A. Provide a UPS backup in each SCADA panel that will provide continuous communication for at least 30 minutes following a power failure. UPS power shall be provided, at a minimum, to the following equipment:
 - 1. PLCs and I/O cards, controllers, and OIPs.
 - 2. Network switches, signal converters, and other communication devices.
 - 3. Power fail and communication indicating lights and alarm devices.
 - 4. Power supplies for loop-powered instruments.
 - 5. Intrusion detection system devices.
- B. Interior control panels with PLCs shall be provided with a true online 120-volt AC UPS.
 - 1. Each UPS shall be provided with a dry contact output for remote indication of a common UPS alarm or if UPS batteries need replacement.
 - 2. UPS shall be APC with relay I/O module, Liebert GXT5 with relay card, or Eaton 9SX.

2.06 INDUSTRIAL CONTROL RELAYS AND CONTACTORS

- A. Industrial control and power relays shall be installed in motor controller enclosures where required by System Supplier. Relays used to interface with PLC I/O, motor control circuits, hard-wired control logic, and for loads less than 8 amps shall be terminal style, interposing/isolation relays. Relays for inductive loads, alarm lights, alarm horns, field wiring, or loads up to 15 amps shall be industrial, general purpose square base relays. Relays for monitoring the output voltage of uninterruptible power supplies shall be UPS voltage monitoring relays. Contactors for motor power control shall be industrial, electrically-held power contactors.
- B. Relays shall meet the following requirements:
 - 1. Interposing/Isolation Relays:
 - a. Configuration: SPDT or DPDT as required by System Supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 VAC, or as required by System Supplier.
 - d. Contact Rating: 8 A (DPDT), 16 A (SPDT).
 - e. Mechanical Operating Life: 10 million cycles.
 - f. Status: On-Off flag-type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700-HK, or equal.
 - 2. General Purpose Relays:
 - a. Configuration: DPDT or 3PDT as required by System Supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 VAC.
 - d. Contact Rating: 15 A, minimum; 3/4 hp.
 - e. Mechanical Operating Life: 10 million cycles.
 - f. Status: On-Off flag-type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700-HB, or equal.
 - 3. UPS Voltage Monitoring Relays:
 - a. Configuration: SPDT.
 - b. Mounting: DIN rail.
 - c. Voltage: 120 VAC.
 - d. Contact Rating: 15 A.
 - e. Mechanical Operating Life: 10 million cycles.
 - f. Over-Voltage Range: 80 to 150 VAC, adjustable.

- g. Under-Voltage Range: 30 to 95% of pickup, adjustable.
- h. Drop-Out Time Delay: 0.1 to 10 seconds, adjustable.
- i. UL listed.
- j. Manufacturer: Macromatic, VWKE120A, or equal.
- 4. Power Contactors:
 - a. Configuration: Electrically-held, 3 poles.
 - b. Mounting: DIN rail.
 - c. Voltage: 120 VAC.
 - d. Minimum Contact Rating: 20 A continuous, 1 hp.
 - e. Mechanical Operating Life: 1.3 million cycles.
 - f. UL listed.
 - g. NEMA rated.
 - h. Manufacturer: Allen-Bradley, Bulletin 300, or equal.

2.07 FIBER-OPTIC COMMUNICATION SYSTEMS

- A. System Supplier shall provide the design, layout, and configuration of the fiber-optic communication system based on schematic interconnections shown on the Drawings. Device-to-device, line-connected networks and daisy chaining of switches and other network-connected devices is not acceptable, except where shown on the Drawings.
- B. System Supplier shall provide the necessary communication modules for all switches and other network-connected devices specified herein or shown on the Drawings to be connected to fiber-optic cabling. System Supplier shall coordinate the necessary final connections provided by CONTRACTOR as needed to prevent excessive signal attenuation between switches and other network-connected devices.
- C. System Supplier shall provide all fiber-optic patch cabling within control panels and equipment furnished by System Supplier that does not extend outside of control panels and equipment. All fiber-optic cabling extending outside of control panels and equipment provided by System Supplier shall be provided, terminated, and tested by CONTRACTOR with supervision by System Supplier. CONTRACTOR shall terminate spare runs of fiber-optic cable in all patch panels, including patch panels furnished by System Supplier, or terminate spare runs of fiber-optic cable with connectors with suitable covers at each terminating location without a patch panel.

2.08 SPREAD SPECTRUM RADIO TELEMETRY SYSTEM

- A. Provide radios at PLC controller locations described herein and all appropriate accessories for a complete, operational radio telemetry system. Radios shall include connections for both Ethernet and serial (RS232) communications, as well as a slot for a cellular data SIM card for back-up to radio frequency communications.
- B. System Supplier shall design the radio telemetry system for at least 99.9% reliability.
- C. Master Station and Remote Radios:
 - 1. Spread spectrum radios shall meet FCC and IC rules for unlicensed radio operation in the 902 to 928 MHz band. All radios shall be capable of operating as a stand-alone Multiple Address System (MAS), as a stand-alone Point-to-Point link, or as a "Tail End" or "Last Mile" link from an existing MAS radio system. The radio shall use the spread spectrum Frequency Hopping technique for data communications. Interference rejection shall be provided by the use of traditional narrow band filtering techniques to reject noise and interference. Forward error correction, automatic retransmission, and

CRC/QRQ shall be used so that a 10^{-6} Bit Error Rate is achieved at a signal strength of -110 dBm. All radios shall be manufactured in the United States of America, and the radio manufacturer shall be certified as an ISO 9001 approved facility. The radios shall have FCC and Industry Canada certification under FCC rules Part 15.247 and IC RSS-210. No license shall be required to operate the radios provided.

2. The radio shall be UL listed for normal operation. As an option, the radio shall be UL/FM recognized for Class I, Division 2, Groups A, B, C, D hazardous locations when installed in an approved enclosure.
3. The radios shall be capable of transmitting data at standard rates between 1200 and 115,200 bits per second.
4. Communications between the central master site and all remote sites shall be direct and 100% transparent communications for all standard asynchronous protocols. The radio shall transmit data in the same format as used by the data system, seamlessly and without interruptions. Radio overhead or latency shall average 6 to 10 ms but may not exceed 30 ms for communications from master to remote or from remote to master. It will not be acceptable to require that the user's protocol be modified in any way for compatibility with radio communications nor will it be acceptable to require a special protocol driver within the radio. It will not be acceptable to "packetize" data in a manner that would result in data gaps or in parts of the message being sent in separate packets that could be received out of order by the receiving radio. It will not be acceptable to require a front-end controller to convert protocols or reorder data packets. It will not be acceptable to transmit data in a nondeterministic manner so that data would be received longer than 30 ms after transmission.
5. The master and remote radios shall be interchangeable so that all radios are identical. The user shall be able to select master, remote, or repeater operation by a software command.
6. The radios shall be designed to minimize interference from noise and other radios operating in this band. Transmit power shall be adjustable from 0.1 watt to the FCC maximum of 1.0 watt. The radio shall be capable of hopping over 128 separate frequencies from 902 to 928 MHz. To provide the ability to operate multiple radio systems in one area and to avoid possible interference that may be in this band, the 128 frequencies shall be divided into eight nonoverlapping zones. The radio shall be able to operate in eight zones or any combination of four to seven zones. Zone selection shall be initiated by a command from the master radio that is broadcast to all radios in the system. In addition, the radios shall have a minimum of 65,000 separate system addresses.
7. The radios shall utilize CRC error checking and automatic retransmission to minimize the effects of in-band interfering signals.
8. The radio system shall utilize Digital Signal Processing (DSP) to automatically optimize communication performance and eliminate the requirements for internal tuning adjustments. Radios that require internal adjustments will not be considered.
9. Software/Firmware configurable operating parameters shall be available to provide maximum radio system performance and that throughput is available for a wide variety of system conditions and configurations. The data rate shall be adjustable from 1,200 to 115,200 bps. It shall also have two different hop times to optimize for best throughput or least delay. It shall be possible to operate the system in a mode that buffers data or in a mode that transmits data as it is received by the radio.
10. The radios shall be capable of operation on DC voltages from 6 to 30 VDC.
11. The radio system shall provide integral diagnostic capability to allow the user to verify communications reliability between the master and remote radios. Diagnostic data shall be continuously acquired by the master radio without interrupting the user's data communications. In addition, diagnostic communication shall be usable from any radio in the network, not just the master. All system configuration parameters shall be capable

of being set by the user via a terminal or PC connected directly to the radio. Parameters for remote radios shall be selectable over the air from the master. It will not be acceptable to require an external interface box to adapt a hand-held terminal or PC to the radio, nor will it be acceptable to have any internal adjustments or switch settings of any type.

12. The radio shall include "Sleep Mode" as a standard feature. Sleep mode shall reduce power consumption to 8 ma while allowing the remote site to maintain synchronization with the master radio. The radio shall become fully operational no longer than 28 ms after "Wake Up" is initiated.
13. The radios shall support automatic store and forward so that data can be transmitted through an unlimited number of repeaters. The repeaters shall be able to also act as RTU radios.
14. Using Store and Forward techniques, the radios shall be able to perform alternate routing in case of repeater failure and implement both a "Primary" route scheme or a "use any equally" route scheme.
15. A separate diagnostic port shall be available to enable the remote RTU/PLC/Terminal to access all radio diagnostics directly from the radio and enable radio diagnostic data to be incorporated into the SCADA System database.
16. Radio performance (Zone Quality) statistics shall be maintained by the master radio for each of the eight frequency zones. This information shall include (a) the total number of data packets transmitted, (b) the total number of received packets, and (c) the total number of packets with errors.
17. Local diagnostic information shall be available from each radio via external LEDs and, include as a minimum:

Diagnostic Error Codes	Diagnostic Values
Synthesizer out of lock	Received Signal Strength
Voltage regulator failure	Supply Voltage
Radio not calibrated	Temperature (internal)
Improper microcontroller operation	Zone Signal Quality
Data parity fault	
Data framing error	
Voltage regulator out of tolerance	External LED Indicators
DC input voltage out of tolerance	Power ON
Low Received Signal Strength alarm	Radio Fault
Internal temperature out of tolerance	Sleep Mode On
Radio address not programmed	Transmit Data
	Receive Data
	Radios Communications Synchronized

18. Radio diagnostics shall be an integral part of the radio. It will not be acceptable to require an external interface box to adapt a terminal or PC to access radio diagnostics, nor will it be acceptable to require any internal adjustments or switch settings of any type.
19. Radio diagnostics shall include direct read signal strength measurements in -dBm for path checking and antenna aiming.

D. The radio system shall meet the following specifications:

1. General:
 - a. Frequency Range: 902 to 928 MHz, FCC Part 15 Spread Spectrum Band.
 - b. Frequency Stability: $\pm 0.00015\%$ (1.5 PPM), -30°C to +60°C (-22°F to 140°F).

- c. Frequency Hopping Range: 128 channels/frequencies.
- d. Hop Dwell Times: 7 ms to 28 ms, user-selected.
- e. Frequency Zones: 8 zones.
- f. Hop Pattern: Defined by system address.
- g. Unit Address: 0 to 65,000.
- h. System Address: 1 to 65,000.
- 2. Data Characteristics:
 - a. User Interface: RS-232 and RS-485.
 - b. Data Latency: 7 ms typical.
 - c. Byte Length: 10/11 bits.
 - d. Data Interface baud Rate: 1,200 to 115,200 bps.
 - e. Data Rate over the RF Channel: 115 kbps.
 - f. Transparent Communications: For asynchronous protocols with 10/11 bit bytes.
 - g. Modulation Type: Binary CPFSK.
 - h. Connector Type: DB-9 Female.
 - i. Output Impedance: 50 Ohms.
- 3. Transmitter:
 - a. Power Output: 0.1 to 1.0 watt (+20 to +30 dBm), user settable.
 - b. Duty Cycle: Continuous.
 - c. Spurious Emissions: 60 dBc.
 - d. Harmonic Emissions: 70 dBc.
 - e. Transmitter Keying: Data activated.
 - f. VSWR: Unlimited no damage.
 - g. Modulation Type: Binary CPFSK.
 - h. Output Impedance: 50 ohms.
- 4. Receiver:
 - a. Type: Double conversion superheterodyne.
 - b. Bit Error Rate: Less than 10^{-6} at -110 dBm.
 - c. Intermodulation: 59 dB minimum (EIA).
 - d. Desensitization: 75 dB.
 - e. Spurious: 70 dB minimum.
 - f. RSSI Range: -40 dBm to -120 dBm.
- 5. Primary Power:
 - a. Voltage: 6 to 30.0 VDC Operating Range (13.8 VDC nominal).
 - b. TX Supply Current: 500 ma @ 13.8 VDC.
 - c. RX Supply Current: 125 ma @ 13.8 VDC.
 - d. Sleep mode current: 8 ma @ 13.8 VDC.
 - e. Reverse Polarity Protection: Included.
- 6. Environmental:
 - a. Humidity: 95% at 40°C (104°F); noncondensing.
 - b. Temperature Range: -40°C to 70°C (-22°C to 140°F) minimum.
- 7. Security:
 - a. Encryption: 128-bit RC4, or better.
 - b. Key Management: Automatic key rotation on traffic and/or time.
 - c. Two-way authentication: Wireless MAC-based list at Access Point and remote.
 - d. HTTP encryption: MD5 Digest, or equivalent.
 - e. Early warning notification: SNMP traps on security-related events.
- 8. Agency Certifications (US):
 - a. FCC: Part 15.
 - b. FM (for Hazardous Locations): Class 1, Division 2, Groups A, B, C, and D.
- E. The radios shall be model MDS Orbit MCR 900, as manufactured by Microwave Data Systems, or equal.

- F. The radio telemetry system manufacturer shall provide the radio antennas for each site in the system. Instructions for installing and grounding these antennas shall be given to CONTRACTOR to provide a reliable system. Unless specifically stated, the antennas shall be attached to existing structures. Each remote and the master station shall be tested to verify that reflected power is 5% of forward power or less.
- G. Antennas shall be directional or omnidirectional as described below. They shall be of aluminum or fiberglass construction and rated to withstand at least 100 mph winds. Adequate lengths of transmission cable shall be provided for connection between the antenna and radio transceiver at each location.
1. Antenna for the master station shall be omnidirectional, or as required for the system configuration, and shall meet the following specifications:
 - a. Type: Dual conversion, superheterodyne.
 - b. Frequency Range: 902 to 928 MHz.
 - c. Gain: 7 dB.
 - d. Maximum Power Input: 150 Watts.
 - e. VSWR: Less than 1.5.
 - f. Lightning Protection: Direct ground protection to tower with Citel Model P8AX, or equal, surge protection device.
 - g. Connector: 18-inch flexible extension (RG-393/U), Type N male with neoprene housing.
 - h. Mounting Hardware: As required by manufacturer.
 - i. Acceptable Manufacturers: Telewave, Scala, Maxrad, or equal.
 2. Antennas for each remote site shall be directional (YAGI) type, or as required for the system configuration, with the following characteristics:
 - a. Type: Dual conversion, superheterodyne.
 - b. Frequency Range: 902 to 928 MHz.
 - c. Gain: 10 dB, minimum.
 - d. Maximum Power Unit: 150 watts.
 - e. Lightning Protection: Direct ground protection to mast with Citel Model P8AX, or equal, surge protection device.
 - f. Front-to-Back Ratio: 20 dB, minimum.
 - g. Connector: Type N, female.
 - h. Mounting Hardware: As recommended by manufacturer.
 - i. Acceptable Manufacturers: Telewave, Scala, Maxrad, or equal.
- H. All antennas shall be grounded in accordance with the antenna manufacturer's recommendations.
- I. Transmission cable for all antennas shall be low-loss foam dielectric-type Heliax cable with copper-clad aluminum inner conductor and corrugated copper outer conductor with 100% coverage. Cables over 100 feet shall have a hollow copper, round-tube inner conductor.
1. Provide a 6-foot section (3-foot for master radio) of "super flexible" transmission cable with male Type N connectors at the radio antenna ports to the connector at the enclosure. This section shall pass through the enclosure. Provide standard Type N connectors for connection to a continuous cable extending from enclosure to antenna. Cable shall be weatherproof and suitable for direct environmental exposure. Connections shall have O-ring seals.
 2. Provide a male-to-male Type N connector where the antenna cable leaves the enclosure in which the radio is mounted. Cable from radio to connector at enclosure shall be "super flexible" and from the enclosure to the antenna shall be low-loss foam as described below. Provide a coaxial lightning arrestor for the antenna cable.

3. Coaxial lines to antennas shall be installed in conduit. Provide a drip loop where antenna cabling exits the conduit.
4. Antenna cables shall be as manufactured by Commscope, model as follows, or equal.
 - a. For run lengths less than 50 feet: LDF2-50.
 - b. For run lengths between 50 and 100 feet: LDF4-50.
 - c. For run length greater than 100 feet: AVA5-50.

J. System Supplier shall supervise the installation of all radio systems by CONTRACTOR.

2.09 LIMIT SWITCHES

- A. Limit switches (door switches) where called for on the Drawings shall be Square D, Class 9007, Type C, or equal. Door switches in NEMA 4X areas shall be Omron, Model D4B-21**N. CONTRACTOR shall provide head and body style to fit application.
- B. Limit switches for sensing the position of swing arm check valves shall be Allen-Bradley Bulletin 802T, or equal. Switch shall include enclosure rated for the space installed, cat whisker sensor in length required for application, and mounting hardware for check valve swing arm and flexible cable to junction box.

2.10 CURRENT SWITCHES

- A. Current switches where called for shall be Veris Industries, Hawkeye H800HV, or equal, and include DIN rail mounting hardware.

2.11 RADAR LEVEL TRANSMITTERS

- A. Radar level transmitters shall utilize a microwave, non-contacting method with a beam angle of 8 degrees to measure level with an accuracy of ± 2 mm. Transmitter adjustments shall be performed from a smartphone, tablet, or notebook using Bluetooth. The transmitter shall be loop-powered at 24-volts DC and the output shall be 4-20 mA DC.
- B. Transmitters in non-hazardous locations shall be FM approved and have an operating range of -40°F to 176°F.
- C. Transmitter enclosures that are noted on the Drawings to be provided with a manufacturer-furnished cable shall be PVDF with an IP66/IP68 protection rating and be rated NEMA 4X/6P. The enclosure shall have threaded NPT connections on the process connection and conduit/cable connection and be provided with all required mounting hardware. Transmitters shall be as manufactured by VEGA Model VEGAPULS C 21, or equal. Provide cable length as required for a continuous run to the terminating point as shown on the Drawings. Transmitters shall not be supported using the cables.

2.12 FULL-PROFILE INSERTION FLOW METERS

- A. The insertion flow meter shall be suitable for measuring water flows in the range indicated in the table below. Flow meter shall consist of multi-electrode sensor and remote transmitter.
- B. Flow meter shall be NSF-approved for drinking water applications.
- C. Meter accuracy shall be $\pm 0.5\%$ from 1.0 ft/sec to full scale, and $\pm 1\%$ from 0.3 ft/sec to 1.0 ft/sec.

- D. The remote transmitter shall be designed to operate on 120 VAC, 60 Hz. Outputs shall include a 4-20 mA and totalizer scaled pulse, suitable for driving a solid-state counter. Provide cable, length as required to reach from the flow element to the remote transmitter; CONTRACTOR shall coordinate. Flow meters shall be provided as follows:

Tag No.	Transmitter	Size (Inches)	Maximum Scale
FIT-15-01	Remote	10	1,000 gpm
FIT-15-02	Remote	10	1,000 gpm
FIT-15-03	Remote	10	1,000 gpm
FIT-15-04	Remote	10	1,000 gpm
FIT-15-05	Remote	10	1,000 gpm

- E. Flow element shall be as manufactured by McCrometer, Model FPI Mag Sensor, or equal, and flow transmitter shall be as manufactured by McCrometer, Model ProComm Max Signal Transmitter, or equal.

2.13 MAGNETIC FLOW METERS

- A. The magnetic flow meters shall be suitable for measuring water flows in the range indicated in the table below. The magnetic flow meters shall consist of a flanged flow tube with grounding rings and remote transmitter. The flow tube shall be of 304 stainless steel with hard rubber liner. Flanges shall be carbon steel and conform to ANSI B16.5, Class 150.
- B. The meters shall utilize bipolar DC coil excitation or other means to automatically rezero. Meters shall be provided with grounding rings made of material compatible with electrode material. Electrodes shall be bullet nose, 316 stainless steel, NSF-approved for drinking water applications.
- C. The meter shall incorporate design features to minimize the effect of greasy (nonconductive) coatings or incorporate a means to automatically clean the electrodes during continuous operation. Meter accuracy shall not be affected by greasy coatings, and cleaning of the meter manually shall not be required.
- D. Meter accuracy shall be $\pm 0.5\%$ of rate from 1.0 to 30.0 ft/sec and 0.1% of scale below 1.0 ft/sec when installed with the appropriate upstream and downstream pipe diameters. The meters shall be wet-calibrated in a primary flow laboratory traceable to the National Institute of Standards and Technology. Transmitters and flow tubes shall be interchangeable.
- E. The transmitter shall be designed to operate on 120 VAC, 60 Hz. Power consumption shall not exceed 20 watts. Connections at the flow tube shall be factory-potted. Outputs shall be 4-20 mA and totalizer scaled pulse, suitable for driving a solid-state counter. Pulse width and volume of flow per pulse shall be widely adjustable before or after installation to allow interface with PLC input cards and other devices.
- F. Outputs shall be field-adjustable for range changes. Response time or damping shall be adjustable from 0.8 to 8.0 seconds. The meters shall be operable in all liquids with 5.0 umhos/cm or more conductivity.
- G. The meters shall include empty pipe detection. Provide a single analog output representing instantaneous flow.

- H. Enclosure Ratings:
1. Flow tube enclosure shall be NEMA 4.
 2. Remote transmitter enclosure shall be NEMA 4.
- I. The magnetic flow meters shall be Endress and Hauser ProMag 400, or Krohne Optiflux 2000. Meters shall be sized to match the nominal pipe diameter in which they are installed. Provide cable, length as required, to reach from the flow tube to the remote transmitter; CONTRACTOR shall coordinate. Flow meters shall be provided as follows:

Tag No.	Transmitter	Size (Inches)	Maximum Scale
FIT-15-06	Remote	16	3,000 gpm
FIT-15-07	Remote	12	2,000 gpm
FIT-15-08	Remote	10	2,000 gpm
FIT-15-09	Remote	8	1,000 gpm

- J. Remote transmitter shall be Endress and Hauser ProMag W400 transmitter, or Krohne IFC 300 converter.
- K. Transmitter shall be FM approved and CSA certified. Remote transmitter shall include back-lit display and push buttons or other means for local operation and maintenance. Display shall include instantaneous flow and totalized flow and indication of present faults.
- L. Provide stainless steel information tag that indicates instrument number, service, and calibration range.

2.14 PRESSURE TRANSMITTERS

- A. Pressure transmitters shall sense gauge pressure and provide a 4-20 mAdc signal proportional to the sensed pressure. Pressure transmitters shall accept 24 VDC loop power. Increasing pressure shall result in increasing signal.
- B. Transmitters shall be suitable for use in ambient conditions of 0° to 180°F and 0% to 100% relative humidity.
- C. Accuracy (including linearity, hysteresis, and repeatability) shall be at least $\pm 0.075\%$ of span. Long-term drift shall be less than $\pm 0.05\%$ of the upper range limit over a 5-year period. The transmitter output signal shall not change more than 0.005% of span for a 1 V change in the loop voltage. Ambient temperature effect shall be less than ± 0.6 psi for a 10 to 300 psi transmitter that experiences a 50°F change in ambient temperature within the normal operating range. Mounting position shall not affect transmitter performance. RFI effect shall be less than 0.1% of span for radio frequencies in the range of 27 to 1,000 MHz and field intensity of 30 V/m.
- D. Process connection shall be 316L stainless steel fitting size and type as required by CONTRACTOR. Sensor material shall be 316L stainless steel, with silicone fill fluid. Sensor shall be suitable for use with process liquid/gas temperature from -50°F to 250°F.
- E. Calibrated range shall be determined by CONTRACTOR based on process conditions. Calibrated range and process conditions used to determine range and span limits shall be included in submittal.

- F. Pressure transmitter housing shall be NEMA 4X, epoxy-coated aluminum with a minimum of one 1/2-inch NPT conduit connection. Housing shall provide separation between electronics and field connections.
- G. Digital indicator with transmitter configuration push buttons shall be provided in the transmitter housing. Transmitter configuration shall be performed using push buttons on the transmitter. A HART communicator or other electronic device shall not be required to configure the transmitter.
- H. Transmitter shall be direct-connected to process unless specified otherwise on the Drawings. Provide stainless steel bracket and mounting bolts for surface mounting of transmitter if wall mounting is specified. Provide stainless steel two-valve manifold for pressure transmitters.
- I. Provide stainless steel information tag that indicates instrument number, service, and calibration range.
- J. Pressure transmitters shall be Foxboro Model IGP10S, ABB, or equal.

2.15 SUBMERSIBLE LEVEL TRANSMITTERS

- A. Provide submersible pressure transmitters to measure ground storage tank levels. The transmitters shall be designed for direct submergence in groundwater, surface water, or salt water, and be as manufactured by Endress and Hauser Water Pilot FMX21, Keller Model 0507, or equal.
- B. The cable jacket shall be made of polyurethane and be compatible with groundwater, surface water, or salt water.
- C. The nose cone shall be made of 316 stainless steel.
- D. Transmitted Operating Specifications:
 - 1. Excitation Voltage: 10.5 to 35 VDC.
 - 2. Output: 2-wire, 4-20 mA.
 - 3. Compensated Temperature Range: 14°F to 158°F.
 - 4. Electrical Connection: Vented two-conductor insulated polyurethane cable shielded with aluminum film, strain relief members, and pressure compensation tube with Teflon filter. Cable shall be approved for use in drinking water, and length shall be coordinated with depth of the associated tank.
 - 5. Electronics:
 - a. Internally potted with molded cable.
 - b. Accuracy: $\pm 0.2\%$ of set span.
 - 6. Maximum Diameter: 0.87 inch.
 - 7. Range: 0 to 300 PSI, selected to meet project requirements.
 - 8. Overload Pressure: 580 psi.
 - 9. Insulation Resistance: Less than 0.09 ohms per meter.
- E. Submersible pressure transmitters shall have a ceramic measuring cell and an integral cable that contains a vent tube that references the sensor to atmospheric pressure. The molded polyurethane cable and internal potting in the transmitter shall prevent the ingress of water into the back of the transmitter. The vent tube shall be attached to the back of the sensing element, providing a gauge reference to atmosphere.

- F. Pressure transmitters shall include a terminal enclosure with desiccant to prevent moisture ingress via the vent tube or cable conductors. Enclosure shall dry the air that breathes into the tube via vent opening with a 35-micron PTFE filter that prevents water ingress even during flood conditions. Enclosure shall meet the following requirements:
 - 1. NEMA 4X rated.
 - 2. PVC base and clear Halogen-free self-extinguishing polycarbonate cover.
 - 3. Equipped with screw terminals and DIN rail mounted terminal blocks.
 - 4. Equipped with microfilter that prevents ingress of water.
 - 5. Equipped with desiccant module with sight gage for determining desiccant change intervals.

2.16 OPERATOR INTERFACE PANEL

- A. The operator interface shall meet the following general specifications:
 - 1. Voltage: 85 VAC to 264 VAC.
 - 2. Temperature: 0°C to 55°C.
 - 3. Humidity: 5% to 95% noncondensing.
 - 4. RFI: MIL-STD-461B.
 - 5. EMI: IEEE 472-1974.
 - 6. Communication Port: Ethernet.
- B. The operator interface shall have the following minimum features:
 - 1. Type: Color Active Matrix Thin Film Transistor (TFT) touchscreen LCD.
 - 2. Display Size: 6.5-inch.
 - 3. Resolution: 640 by 480, 18-bit color graphics.
 - 4. Clock: Battery-backed real time.
 - 5. Application Memory: 512 MB.
 - 6. Enclosure: NEMA Type 12.
- C. The operator interface panel shall be as manufactured by Allen-Bradley, Panelview Plus, or equal.

2.17 SURGE PROTECTIVE DEVICES FOR CONTROL PANELS, INSTRUMENTATION, AND NETWORK EQUIPMENT

- A. The incoming power supply of each SCADA panel shall be protected with a surge protective device (SPD). SPD unit shall be as manufactured by Citel, Model DS72US, or equal. Surge protection shall be provided for all phases and neutral.
- B. Each analog signal entering or leaving a supervisory control panel and leaving a building shall be provided with a DIN-rail mounted surge protection device as manufactured by Citel, Model DLA-24D3, or equal. Each transmitter shall be provided with a surge protection device as manufactured by Citel, Model TSP15M, or equal, on the output and Citel, Model DS72US, or equal, on the power supply. Surge protection shall be provided for all phases and neutral.

2.18 FLOW SWITCH

- A. Flow switches shall be paddle type, comprised of 316 stainless steel housing and spring, and 302 stainless steel paddle, suitable for use in water service. Switch shall be mounted in process piping using 1-inch NPT fitting.

- B. Switch shall be suitable for use in pressures up to 2,000 psig. Maximum pressure drop across switch shall be 3 psig.
- C. Switch shall be rated for use in temperatures from -30°F to 300°F.
- D. Switch shall provide SPDT contact for use with external control system. Contact shall be rated for 0.5 A at 120 VAC minimum.
- E. Flow switch shall be Gems Sensors, FS-550 Series.

2.19 INDUSTRIAL ETHERNET SWITCHES

- A. Managed Switches (Gigabit Uplink): Provide managed Ethernet network switches with Gigabit-Uplink SFP ports where shown on the Drawings. Network switches shall be as manufactured by Allen-Bradley Stratix 5200 series or Hirschmann BRS40 series. Each switch shall include, but not be limited to, the following:
 - 1. Selectable Gigabit Ethernet star or ring topology with redundant fail-over. Switches shall be configured for a ring topology, unless noted otherwise.
 - 2. DIN rail mounting and redundant 24-volt DC power supply inputs. Provide redundant power supplies, Hirschmann Model RPS series, or equal.
 - 3. Command line interface, DHCP, and store and forward switching.
 - 4. SNTP real time clock.
 - 5. IP and MAC port security and SNMPv3.
 - 6. Compliance with the following IEEE Standards: 802.1D, 802.1p QoS, 802.3, 802.3u, 802.3x flow control, 802.1w RSTP, and 802.1Q VLAN.
 - 7. SNMP with web browsing for switch configuration, diagnostics, and monitoring.
 - 8. Dry contact alarm output for indication that the primary fiber loop or switch has failed.
 - 9. Up to two combo SFP, Gigabit Ethernet uplink ports and up to 16 copper 10/100 Fast Ethernet ports. The switch shall have a minimum of 25% spare ports. Provide copper SFP transceiver modules as required for the Gigabit Ethernet uplink connections shown on the Drawings.
- B. Provide unmanaged Ethernet switches for networks shown on the Drawings that include only personal computers and/or PLCs. Unmanaged switches shall be as manufactured by Hirschman, Spider Series, or Allen-Bradley Stratix 2000 Series, and include fiber and copper ports to accommodate wiring shown on the Drawings. Each switch shall include the following.
 - 1. Full/half-duplex operation.
 - 2. Auto-sensing speed and flow control.
 - 3. IEEE 802.3 compliance.
 - 4. DIN rail mounting and a 24-volt DC power supply input. Provide a dedicated power supply, Hirschmann Model RPS Series, or equal.
 - 5. Store and forward switching.
 - 6. Minimum of four copper ports.
 - 7. Two spare copper ports.
- C. Provide fiber-to-copper media converters where shown on the Drawings. Media converters shall be unmanaged Ethernet switches shall be as manufactured by Hirschmann, Spider III Premium Series, or equal, and include one combo SFP port and copper ports to accommodate wiring shown on the Drawings. Each media converter shall include the following:
 - 1. DIN rail mounting and a 24-volt DC power supply input. Provide a dedicated power supply, Hirschmann Model RPS series, or equal.

2. Provide fiber SFP transceiver modules as required for the connections shown on the Drawings. SFP transceiver shall operate on the 1310 nm wavelength for 100BASE-FX communications over multi-mode fiber-optic cable using LC-type connectors.

2.20 THREE-PHASE VOLTAGE MONITORS

- A. Provide a voltage monitor in standalone enclosures where specified herein. Voltage monitors shall be Timemark *269, Diversified Electronics SLM-440-ASE, or equal. System Supplier shall select the voltage to match the electrical distribution equipment being monitored. Where installed in the same enclosure as a power meter, the voltage monitor inputs shall be wired in parallel with the power meter voltage sensing conductors and shall be fused.

2.21 NOTIFICATION DEVICES

- A. Nonhazardous and NEMA 4X Locations:
 1. General: The light shall provide a visual warning in the area where a potential hazard may occur in nonrated spaces and NEMA 4X locations.
 2. Required Features:
 - a. Beacon light: LED, field-selectable between steady-on mode (green) and flashing mode (amber and red), field-set to 65 flashes per minute.
 - b. LED colors: Red, green, and amber. LED colors shall be capable of being individually controlled by a remote device. When the circuits for multiple LED colors are energized, the light shall automatically cycle through the energized colors.
 - c. Lens color: Clear.
 - d. Enclosure: UL listed; NEMA 4X.
 - e. Power: 120 VAC.
 3. Product and Manufacturer: Model 105XBRiGA120A as manufactured by Edwards Signaling, or equal.
 4. Provide Model 105BX outlet box attachment and 105BM mounting bracket as manufactured by Edwards Signaling, or equal, for wall mounting the lights.
- B. Alarm Horns:
 1. General: The horn shall provide an audible warning in the area where a potential hazard may occur.
 2. Required Features:
 - a. Decibel output: Minimum 100 dB at 10 feet.
 - b. Enclosure: Cast aluminum/epoxy-coated corrosion-resistant housing.
 - c. Horn diaphragm: Stainless steel.
 - d. Power: 120 VAC.
 3. Product and manufacturer: Series 876-N5 in nonrated and NEMA 4X locations, or equal.
- C. Glass-Break Control Stations:
 1. General: Control stations shall be provided for manual ventilation system shutdown where shown on the Drawings.
 2. Required Features:
 - a. Enclosure: UL listed; glass-break cover with NEMA-rated back box.
 - b. Legend text: HVAC Shut-Down.
 - c. Minimum two normally-open and two normally-closed contacts for monitoring and ventilation system interlocks.
 3. Product and Manufacturer: Model ST120SN4XS304BP2SL in NEMA 4X and exterior locations as manufactured by Pilla, or equal.

- D. Danger Signs:
 - 1. General: Provide a danger sign next to each set of warning lights, strobes, and horns.
 - 2. Required features:
 - a. Material: High impact polystyrene or fiberglass.
 - b. Sign Size: Minimum 14 inches wide by 10 inches high.
 - c. Color: White background with red and black lettering.
 - d. Text shall be determined by OWNER.
 - 3. Provide stainless steel mounting hardware as required.

2.22 POWER METERS

- A. Provide power meters in standalone NEMA 12 enclosures where specified herein. Provide appropriately-sized, metering-class current transformers (CTs) on the load side of the switchboard lugs.
- B. Power meter shall be Allen-Bradley PowerMonitor 5000, Bulletin 1426-M5E, or equal. CTs shall be Allen-Bradley Bulletin 1411-180-XXX, or equal, and shall be rated for ANSI/IEEE C57.13 metering, Class 0.3 or 0.6 accuracy.
- C. Power meter shall be provided with an EtherNet/IP communications module matching the SCADA System communication protocol so that all readings can be monitored at the SCADA System HMI.
- D. Provide a touchscreen display for each power meter mounted on the associated standalone enclosure door. The standalone enclosure shall be provided with a control power transformer, 24-volt DC power supply for the display, fused disconnects for the control power circuit and voltage sensing lines, and CT shorting blocks as specified in Section 26 05 19–Wire.

PART 3–EXECUTION

3.01 VFD ENCLOSURE NOTES

- A. Low Zone Booster Pumps (BP-15-01 and BP-15-02):
 - 1. H-O-A Selector Switch:
 - a. With the H-O-A selector switch in the “Hand” position, the motor shall start and run continuously at the speed set on the VFD HIM.
 - b. With the H-O-A selector switch in the “Off” position, the motor shall be inoperable.
 - c. With the H-O-A selector switch in the “Auto” position, the motor shall be controlled from the SCADA System as described under the East Receiving SCADA Panel.
 - 2. The motor has internal thermostats that shall shut down the motor in the event of overtemperature (“Hand” and “Auto” modes). Manual reset shall be required to restart the motor. Provide a hardwired time delay (0 to 5 seconds) to prevent overtemperature lockouts due to momentary power interruptions.
 - 3. The pump shall shut down and a flow fail alarm indicated at the SCADA System if the limit switch (ZS-15-01 or ZS-15-02) on the pump discharge check valve is not activated before a hardwired time delay (0 to 300 seconds) expires (“Auto” mode only).
 - 4. The motor disconnect has an auxiliary contact that shall be wired to the VFD enclosure such that control power is disconnected when the disconnect is in the “Off” position.
 - 5. All of the above controls shall be hardwired and not through the PLC.

- B. High Zone Booster Pumps (BP-15-03 through BP-15-05):
1. H-O-A Selector Switch:
 - a. With the H-O-A selector switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD HIM.
 - b. With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - c. With the H-O-A selector switch in the "Auto" position, the motor shall be controlled from the SCADA System as described under the East Receiving SCADA Panel.
 2. The motor has internal thermostats that shall shut down the motor in the event of overtemperature ("Hand" and "Auto" modes). Manual reset shall be required to restart the motor. Provide a hardwired time delay (0 to 5 seconds) to prevent overtemperature lockouts due to momentary power interruptions.
 3. The pump shall shut down and a flow fail alarm indicated at the SCADA System if the limit switch (ZS-15-03, ZS-15-04 or ZS-15-05) on the pump discharge check valve is not activated before a hardwired time delay (0 to 300 seconds) expires ("Auto" mode only).
 4. The motor disconnect has an auxiliary contact that shall be wired to the VFD enclosure such that control power is disconnected when the disconnect is in the "Off" position.
 5. All of the above controls shall be hardwired and not through the PLC.

3.02 EAST RECEIVING STATION EXHAUST/SUPPLY FAN CONTROLLER ENCLOSURE NOTES (EF-15-01, SF-15-01, AND EF-15-02)

- A. Chemical Room Ventilation Fan Enclosure (VFE-15-01):
1. Provide a NEMA 4X, FRP enclosure, sized as needed and suitable for wall mounting in the Chemical Room where shown on the Drawings, including but not limited to, the following:
 - a. 20-amp main circuit breaker disconnect with door-interlocked, padlockable handle. Provide defeater to allow opening the door without disconnecting the power feed. Power to the control panel shall be 120 volts, single phase.
 - b. The control panel fault current interrupting rating shall be minimum 10,000 amps.
 - c. Power distribution and overcurrent protective device for all internal and external equipment powered from this control panel. External equipment powered from this control panel shall consist of the following:
 - (1) 120-volt, 15-amp circuit to Chemical Room Exhaust Fan, EF-15-01.
 - (2) 120-volt, 15-amp circuit to Chemical Room Supply Fan, SF-15-01.
 - (3) 120-volt, 5-amp circuit to damper actuator DA-EF-15-01.
 - (4) 120-volt, 5-amp circuit to damper actuator DA-SF-15-01.
 - d. Provide a current switch on each fan's motor branch circuit conductors to generate a "Running" signal when the current switch is activated.
 - e. The following devices shall be mounted on the front door of the enclosure:
 - (1) Red "Ventilation Shutdown" indicating light.
 - (2) The following pilot devices shall be provided for each fan controlled from this control panel:
 - (a) Hand-Off-Auto selector switch.
 - (b) Green "Running" indicating light.
 - (c) Elapsed time meter.
 - f. Hardwired Motor Controls:
 - (1) Chemical Room Exhaust Fan (EF-15-01):
 - (a) H-O-A Selector Switch:
 - i. With the H-O-A Selector Switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - ii. With the H-O-A Selector Switch in the "Off" position, the motor shall be inoperable.

- iii. With the H-O-A Selector Switch in the "Auto" position, the motor shall be controlled from the chemical room light switch as described under Chemical Room Ventilation Controls.
 - (b) The fan shall be interlocked with the Chemical Room glass-break ventilation system control station (CS-15-01) such that when the control station is activated, the fan shall shut down, the "Ventilation Shutdown" indicating light shall be activated, and an alarm shall be activated at the SCADA System. The fan shall remain shut down until the control station is deactivated.
 - (c) The associated damper (DA-EF-15-01) shall open when the motor is running ("Hand" and "Auto" modes).
 - (d) All of the above controls shall hardwired.
- (2) Chemical Room Supply Fan (SF-15-01):
 - (a) H-O-A Selector Switch:
 - i. With the H-O-A Selector Switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - ii. With the H-O-A Selector Switch in the "Off" position, the motor shall be inoperable.
 - iii. With the H-O-A Selector Switch in the "Auto" position, the motor shall be controlled as described under Chemical Room Ventilation Controls.
 - (b) The associated damper (DA-SF-15-01) shall open when the motor is running ("Hand" and "Auto" modes).
 - (c) All of the above controls shall hardwired.
- (3) Chemical Room Ventilation Controls:
 - (a) When the Chemical Room light switch in the On position, the Chemical Room Exhaust Fan (EF-15-01) shall start and run continuously at the speed set on the VFD. When the light switch is in the Off position, the Chemical Room Exhaust Fan shall shut down.
 - (b) When the Chemical Room Exhaust Fan is running, the Chemical Room Supply Fan (SF-15-01) shall start and run continuously at the speed set on the VFD. When the Chemical Room Exhaust Fan shuts down, the Chemical Room Supply Fan shall shut down.

B. Pump Room Exhaust Fan Enclosure (VFE-15-02):

- 1. Provide a NEMA 12 enclosure, sized as needed and suitable for wall mounting in the Pump Room where shown on the Drawings including, but not limited to, the following:
 - a. 15-amp main circuit breaker disconnect with door-interlocked, padlockable handle. Provide a defeater to allow opening the door without disconnecting the power feed. Power to the process control panel shall be 480-volt, three-phase.
 - b. Control panel fault current interrupting rating shall be minimum 22,000 amps.
 - c. Power distribution and overcurrent protective devices for all internal and external equipment powered from this control panel. External equipment powered from this control panel shall consist of the following:
 - (1) 480-volt, 20-amp circuit to Exhaust Fan EF-15-02.
 - (2) 120-volt, 5-amp circuit to Damper Actuator DA-EF-15-02A.
 - (3) 120-volt, 5-amp circuit to Damper Actuator DA-EF-15-02B.
 - d. Provide a control power transformer for 120-volt power to the control circuit and associated dampers.
 - e. Provide interface relays as needed for the 24-volt DC signals. Signals are powered at 24 volts DC from the integrated VFD.

2. The following devices shall be mounted on the front door of the enclosure:
 - a. H-O-A selector switch.
 - b. Green "Running" indicating light.
 - c. Red "Fault" indicating light.
 - d. Elapsed time meter.
 - e. Reset pushbutton.
3. Hardwired Motor Controls:
 - a. The VFD is integrated into the fan's ECM motor located within the fan housing. The integrated VFD includes the following signals:
 - (1) 24-Volt DC Inputs:
 - (a) Start/Stop ("Auto").
 - (b) Start/Stop ("Hand").
 - (2) 24-Volt DC Output: Running.
 - (3) Dry-Contact Output: VFD Fault.
 - b. H-O-A Selector Switch:
 - (1) With the H-O-A selector switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - (2) With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - (3) With the H-O-A selector switch in the "Auto" position, the motor shall start and run at the speed set on the VFD when the room temperature rises above the temperature set on the associated thermostat. The motor shall shut down when the room temperature falls below the temperature set on the associated thermostat.
 - c. The motor has internal thermostats that shall shut down the motor in the event of overtemperature ("Hand" and "Auto" modes). Manual reset shall be required to restart the motor. Provide a hardwired time delay (0 to 5 seconds) to prevent overtemperature lockouts due to momentary power interruptions.
 - d. The associated dampers (DA-EF-15-02A and DA-EF-15-02B) shall each open when the motor is running ("Hand" and "Auto" modes).
 - e. All of the above controls shall be hardwired.

3.03 WEST RECEIVING STATION EXHAUST/SUPPLY FAN CONTROLLER ENCLOSURE NOTES (EF-20-01, SF-20-01, AND EF-20-03)

- A. Chemical Room Ventilation Fan Enclosure (VFE-20-01): Provide a NEMA 4X, FRP enclosure, sized as needed and suitable for wall mounting in the Chemical Room where shown on the Drawings including, but not limited to, the following:
 1. 20-amp main circuit breaker disconnect with door-interlocked, padlockable handle. Provide defeater to allow opening the door without disconnecting the power feed. Power to the control panel shall be 120 volts, single phase.
 2. The control panel fault current interrupting rating shall be minimum 10,000 amps.
 3. Power distribution and overcurrent protective device for all internal and external equipment powered from this control panel. External equipment powered from this control panel shall consist of the following:
 - a. 120-volt, 15-amp circuit to Chemical Room Exhaust Fan, EF-20-01.
 - b. 120-volt, 15-amp circuit to Chemical Room Supply Fan, SF-20-01.
 - c. 120-volt, 5-amp circuit to damper actuator DA-EF-20-01.
 - d. 120-volt, 5-amp circuit to damper actuator DA-SF-20-01.
 4. Provide a current switch on each fan's motor branch circuit conductors to generate a "Running" signal when the current switch is activated.
 5. The following devices shall be mounted on the front door of the enclosure:
 - a. Red "Ventilation Shutdown" indicating light.

- b. The following pilot devices shall be provided for each fan controlled from this control panel:
 - (1) Hand-Off-Auto selector switch.
 - (2) Green "Running" indicating light.
 - (3) Elapsed time meter.
 - 6. Hardwired Motor Controls:
 - a. Chemical Room Exhaust Fan (EF-20-01):
 - (1) H-O-A Selector Switch:
 - (a) With the H-O-A selector switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - (b) With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - (c) With the H-O-A selector switch in the "Auto" position, the motor shall be controlled as described under Chemical Room Ventilation Controls.
 - (2) The associated damper (DA-EF-20-01) shall open when the motor is running ("Hand" and "Auto" modes).
 - (3) All of the above controls shall hardwired.
 - b. Chemical Room Supply Fan (SF-20-01):
 - (1) H-O-A Selector Switch:
 - (a) With the H-O-A in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - (b) With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - (c) With the H-O-A selector switch in the "Auto" position, the motor shall be controlled from the chemical room light switch as described under Chemical Room Ventilation Controls.
 - (2) The associated damper (DA-SF-20-01) shall open when the motor is running ("Hand" and "Auto" modes).
 - (3) All of the above controls shall hardwired.
 - c. Chemical Room Ventilation Controls:
 - (1) When the Chemical Room light switch in the on position, the Chemical Room Exhaust Fan (EF-20-01) shall start and run continuously at the speed set on the VFD. When the light switch is in the off position, the Chemical Room Exhaust Fan shall shut down.
 - (2) When the Chemical Room Exhaust Fan is running, the Chemical Room Supply Fan (SF-20-01) start and run continuously at the speed set on the VFD. When the Chemical Room Exhaust Fan shuts down, the Chemical Room Supply Fan shall shut down.
- B. Meter Room Ventilation Fan Enclosure (VFE-20-02): Provide a NEMA 12 enclosure, sized as needed and suitable for wall mounting in the Meter Room where shown on the Drawings including, but not limited to, the following:
 - 1. 20-amp main circuit breaker disconnect with door-interlocked, padlockable handle. Provide defeater to allow opening the door without disconnecting the power feed. Power to the control panel shall be 120 volts, single phase.
 - 2. The control panel fault current interrupting rating shall be minimum 10,000 amps.
 - 3. Power distribution and overcurrent protective device for all internal and external equipment powered from this control panel. External equipment powered from this control panel shall consist of the following:
 - a. 120-volt, 20-amp circuit to Chemical Room Exhaust Fan, EF-20-03.
 - b. 120-volt, 5-amp circuit to damper actuator DA-EF-20-03A.
 - c. 120-volt, 5-amp circuit to damper actuator DA-EF-20-03B.

4. Provide interface relays as needed for the 24-volt DC signals. The signals are powered at 24 volts DC from the integrated VFD.
5. Provide a current switch on the fan's motor branch circuit conductors to generate a "Running" signal when the current switch is activated.
6. The following devices shall be mounted on the front door of the enclosure: The following pilot devices shall be provided for the fan controlled from this control panel:
 - a. Hand-Off-Auto selector switch.
 - b. Green "Running" indicating light.
 - c. Elapsed time meter.
7. Hardwired Motor Controls (Meter Room Exhaust Fan [EF-20-01]):
 - a. H-O-A Selector Switch:
 - (1) With the H-O-A selector switch in the "Hand" position, the motor shall start and run continuously at the speed set on the VFD.
 - (2) With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - (3) With the H-O-A selector switch in the "Auto" position, the motor shall start and run at the speed set on the VFD when the room temperature rises above the temperature set on the associated thermostat. The motor shall shut down when the room temperature falls below the temperature set on the associated thermostat.
 - b. The associated dampers (DA-EF-20-03A and DA-EF-20-03B) shall each open when the motor is running ("Hand" and "Auto" modes).
 - c. All of the above controls shall hardwired.

3.04 SCADA PANEL—GENERAL

- A. Control descriptions described herein are specific in nature to the equipment associated with each SCADA panel. CONTRACTOR shall refer to Section 1.11—General Control Algorithms for additional programming requirements. Control descriptions shall reside in each local PLC and not in the Main PLC.
- B. UPS's installed in all SCADA panels shall be configured to provide a dry contact output to the PLC in the event of a UPS common alarm. The common alarm shall include, but not be limited to, "UPS Fault" and "Replace Battery" alarms. Indication of a "UPS Common Alarm" shall be provided at the SCADA System for each UPS.
- C. Each UPS shall be plug-connected inside the SCADA panels with a dedicated receptacle and overcurrent protective device. All UPS-powered devices shall be continuously powered through the UPS under normal operating conditions. Provide a UPS voltage monitoring relay on the output of each UPS and a hardwired bypass circuit to automatically bypass the UPS with line-side control power when the UPS output rises 110% above or falls 90% below the rated UPS output voltage. Provide a stand or shelf for each UPS and any external batteries so they do not sit on the bottom of the enclosure.
- D. Each SCADA panel shall have an exterior, panel-mounted receptacle and programming port for the Ethernet network mounted to the front of the panel. The receptacle and programming port shall be provided to allow for PLC programming via laptop without opening the panel door.
- E. Provide a control power fail relay in each SCADA panel that shall be used to indicate an incoming control power fail alarm at the SCADA System. Provide a red indicating light on the front of each SCADA panel to indicate a loss of incoming line power to the SCADA panel. Control power fail wiring shall be hardwired and not through the PLC.

- F. The signal contact on each managed network switch shall be configured to activate an alarm at the SCADA System for any of the following minimum conditions: Connection errors and power supply fault.
- G. Refer to the Section 26 09 90–SCADA System I/O Listing for all required I/O that shall interface with each PLC. For each PLC, provide the lesser of a minimum of 25% spares or one completely spare I/O module for analog and discrete inputs and outputs. All spare and unused I/O shall be wired to terminal blocks. Where multiple I/O modules of the same type (e.g., digital input, digital output, analog input, analog output, etc.) are provided, signals associated with similar equipment, devices, and instruments shall be partitioned onto separate I/O modules. System Supplier shall not be required to provide additional I/O modules beyond those needed for the signals and spare I/O capacity requirements specified herein.
- H. All equipment shown in the Section 26 09 90–SCADA System I/O Listing with a start/stop output from the PLC shall have an operator-selectable switch at the SCADA System that shall allow/prevent that piece of equipment from operating on the standby generator. This control shall be functional only when the automatic transfer switch is in the emergency position.

3.05 EAST RECEIVING STATION SCADA PANEL (SCC-15)

- A. Provide a new NEMA 12, freestanding, PLC-based supervisory control center, sized a minimum of 24 inches and maximum of 36 inches wide by 20 inches deep by 90 inches high, where shown on the Drawings. All control algorithms and alarms described herein shall be programmed into this PLC. Provide space below or adjacent to the new PLC on the back panel within this SCC for a future I/O rack consisting of a power supply, Ethernet communication module, and five I/O cards.
- B. Low Zone Booster Pumps (BP-15-01 and BP-15-02) shall each be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
 - 1. In SCADA “Hand,” the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 - 2. In SCADA “Auto,” the pumps shall be controlled based on the level in the selected tank. The operator shall be able to select which elevated tank (Tank 1 or Tank 8) shall be used for control of the pumps as follows:
 - a. The operator shall be able to select a “Fixed” mode or “Automatic” mode for alternation of the pumps as follows:
 - (1) In “Fixed” mode, the pumps shall remain in the assigned control stages described below with alternation of the pumps done manually by the operator.
 - (2) In “Automatic” mode, there shall be an automatic alternator within this PLC that shall rotate the pump stage assignments from one stage to the next each time the Stage 1 Pump shuts down. In addition, provide an operator-adjustable “Maximum Stage 1 Pump Runtime” setpoint (0 to 168 hours) to automatically alternate the pumps from one stage to the next when the Stage 1 Pump has been running continuously for the Maximum Stage 1 Pump Runtime setpoint. If the pump previously assigned to a stage was running when the automatic alternation is initiated, the new pump being rotated into that stage shall start prior to shutting down the previously-assigned pump.
 - (3) If any pump called to run fails to start, is operating and fails (VFD Fault, Flow Fail, or Motor Overtemperature), or is taken out of “Auto” (SCADA or VFD

- enclosure selector switches), the pump in the subsequent stage shall rotate into the failed pump's stage and all other pumps shall rotate up one stage.
- b. There shall be a two-stage matrix that allows the operator to assign a pump to each of the two stages. Any pump shall be able to be assigned to any stage, but no more than one pump shall be allowed to be assigned to any stage.
 - c. There shall be operator-adjustable start and stop level setpoints (0 to 200 feet), minimum and maximum level setpoints (0 to 200 feet), and minimum and maximum speed (0 to 100%) setpoints for each stage. The minimum and maximum speed setpoints shall be associated with the maximum and minimum level setpoints, respectively.
 - d. When the level in the selected tank falls below the Stage 1 start level setpoint, the selected Stage 1 pump shall start and ramp to the Stage 1 maximum speed setpoint. This PLC shall then vary the speed of the Stage 1 pump linearly between the Stage 1 maximum level setpoint and the Stage 1 minimum level setpoint. When the level in the selected tank rises above the Stage 1 stop level setpoint, the Stage 1 pump shall shut down.
 - e. When the level in the selected tank falls below the Stage 2 start level setpoint, the selected Stage 2 pump shall start and both Stage 1 and Stage 2 pumps shall ramp to the Stage 2 maximum speed setpoint. This PLC shall then vary the speed of both pumps linearly between the Stage 2 maximum level setpoint and Stage 2 minimum level setpoint. When the level in the selected tank rises above the Stage 2 stop setpoint, the Stage 2 pump shall shut down and the Stage 1 pump shall be controlled from the Stage 1 setpoints described above.
 - f. The current stage shall be indicated at the SCADA System.
- C. High Zone Booster Pumps (BP-15-03 through BP-15-05) shall each be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," the pumps shall be controlled based on the level in an operator-selectable tank (Tank 9 or Stateville Tank) as follows:
 - a. The operator shall be able to select a "Fixed" mode or "Automatic" mode for alternation of the pumps:
 - (1) In "Fixed" mode, the pumps shall remain in the assigned control stages described below with the operator providing manual alternation of the pumps.
 - (2) In "Automatic" mode, there shall be an automatic alternator within this PLC that shall rotate the pump stage assignments from one stage to the next each time the Stage 1 pump shuts down. In addition, provide an operator-adjustable "Maximum Stage 1 Pump Runtime" setpoint (0 to 168 hours) to automatically alternate the pumps from one stage to the next when the Stage 1 pump has been running continuously for the Maximum Stage 1 Pump Runtime setpoint. If the pump previously assigned to a stage was running when the automatic alternation is initiated, the new pump being rotated into that stage shall start prior to shutting down the previously-assigned pump.
 - (3) If any pump is called to run and fails to start, is operating and fails (VFD Fault, Flow Fail, or Motor Overtemperature), or is taken out of "Auto" (SCADA or VFD enclosure selector switches), the pump in the subsequent stage shall rotate into the failed pump's stage, and all other pumps shall rotate up one stage.
 - b. There shall be a three-stage matrix that allows the operator to assign a pump to each of the three stages. Any pump shall be able to be assigned to any stage, but no more than one pump shall be allowed to be assigned to any stage and each pump shall only be allowed to be assigned to one stage.

- c. There shall be operator-adjustable start and stop level setpoints (0 to 200 feet), minimum and maximum level setpoints (0 to 200 feet), and minimum and maximum speed (0 to 100%) setpoints for each stage. The minimum and maximum speed setpoints shall be associated with the maximum and minimum level setpoints, respectively.
 - d. When the level in the selected tank falls below the Stage 1 start level setpoint, the selected Stage 1 pump shall start and ramp to the Stage 1 maximum speed setpoint. This PLC shall then vary the speed of the Stage 1 pump linearly between the Stage 1 maximum level setpoint and the Stage 1 minimum level setpoint. When the level in the selected tank rises above the Stage 1 stop level setpoint, the Stage 1 pump shall shut down.
 - e. When the level in the selected tank falls below the Stage 2 start level setpoint, the selected Stage 2 pump shall start and both the Stage 1 and Stage 2 pumps shall ramp to the Stage 2 maximum speed setpoint. This PLC shall then vary the speed of both pumps linearly between the Stage 2 maximum level setpoint and Stage 2 minimum level setpoint. When the level in the selected tank rises above the Stage 2 stop setpoint, the Stage 2 pump shall shut down and the Stage 1 pump shall be controlled from the Stage 1 setpoints described above. This sequence shall be repeated for additional stages.
 - f. The current stage shall be indicated at the SCADA System.
- D. Ground Level Reservoir High Zone Influent Fill Flow Control Valve (FCV-15-01) shall be controlled from this PLC through the valve controller with a SCADA Open-Close-Auto switch as follows:
- 1. In SCADA "Open," the valve shall open.
 - 2. In SCADA "Close," the valve shall close.
 - 3. In SCADA "Auto," the Auto Mode output shall be active and there shall be operator-adjustable "Daytime Start" and "Nighttime Start" time-of-day (hour and minute), "Daytime Fill Flow Rate" and "Nighttime Fill Flow Rate" (0 to 1,000 gpm), "Reservoir Start Fill Level" (0 to 45.0 feet), and "Reservoir Stop Fill Level" (0 to 45.0 feet) setpoints. Control of the valve shall be as follows:
 - a. Operator shall be able to assign either transmitter reservoir (LT-30-01 or PIT-30-01) as the active transmitter for control of the valve as described below. The unselected transmitter shall automatically be assigned as the standby transmitter. If the active transmitter fails, the standby transmitter shall automatically become the active transmitter. Indication of the active transmitter shall be displayed at the SCADA System. Operator shall be able to take either level transmitter out of service using a check box at the SCADA System. If both transmitters fail or are taken out of service, the valve shall close, and an alarm shall be activated at the SCADA System.
 - b. When the Daytime Start time-of-day is reached, the Reservoir Fill Flow Setpoint shall be equal to the Daytime Fill Flow Rate. When the level in the reservoir falls below the Reservoir Start Fill Level, the Reservoir OK to Fill output shall be active. When the level in the reservoir rises above the Reservoir Stop Fill level, the Reservoir OK to Fill output shall be deactivated and the Reservoir Full output shall be active.
 - c. When the Nighttime Start time-of-day is reached, the Reservoir Fill Flow Setpoint shall be equal to the Nighttime Fill Flow Rate. When the level in the reservoir falls below the Reservoir Start Fill Level, the Reservoir OK to Fill output shall be active. When the level in the reservoir rises above the Reservoir Stop Fill level, the Reservoir OK to Fill output shall be deactivated and the Reservoir Full output shall be active.

4. 24-volt DC power to the valve controller shall be from the SCADA panel and shall be fused. Provide a 24-volt DC power supply, sized as needed, for power to the valve controller.
- E. The Influent Chlorine Metering Pump (CP-15-01) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," the operator shall have the ability to select which flow meter (GPWC Influent FIT-15-06 or High Zone Influent FIT-15-09) shall be used for control of the pump. Indication of the selected flow meter shall be displayed at the SCADA System.
 - a. When the selected flow rises above an operator-adjustable minimum flow (0 to 100.0 gpm) setpoint, and the flow switch in the influent piping (FS-15-01) is made, the chemical feed pump shall start and the speed shall be controlled by the PLC using the following equation. Provide power relays as needed to energize the Influent Chlorine Metering Pump receptacle.

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} * S_{STR}}$$

Where:

S_P = Pump Speed (%)
 Q_{MGD} = Influent Flow (FIT-15-06 or FIT-15-09) (mgd)
 C_{PPM} = Chemical Feed Concentration (Operator Adjustable) (mg/L)
 S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)
 Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (gpd)

- b. When the selected flow is not above the minimum flow setpoint, or the flow switch is not made, the chemical feed pump shall not operate. A flow fail alarm shall be indicated at the SCADA system if the flow switch is not activated.
- F. Low Zone Chlorine Metering Pump (CP-15-02) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," the pump shall start and run whenever either of the low zone pumps (BP-15-01 or BP-15-02) are running and the associated limit switch (ZS-15-01 or ZS-15-02) is made. When both booster pumps are shut down or a limit switch is not made, the chemical feed pump shall not operate. The speed of the pump shall be calculated using the following equations.
 3. There shall be an operator-adjustable "Speed Adjustment Time Delay" (0 to 600 seconds) such that after the PLC changes the speed of the pump, the PLC shall wait for the time delay to expire before changing the speed again.

$$C_{PPM} = D_{CFC} - C_{PS}$$

Where:

C_{PPM} = Chemical Feed Concentration (mg/L)
 D_{CFC} = Desired Chemical Feed Concentration (Operator-Adjustable) (mg/L)
 C_{PS} = Pump Influent Chlorine Concentration (AIT-15-05) (mg/L)

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} \cdot \frac{S_{STR}}{S_{STR}}}$$

Where:

S_P = Required Pump Speed (%)
 Q_{MGD} = Low Zone Booster Pump Flow (FIT-15-08) (mgd)
 C_{PPM} = Chemical Feed Concentration (mg/L)
 S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)
 Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (gpd)

- G. High Zone Chlorine Metering Pump (CP-15-03) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," the pump shall start and run whenever any of the high zone pumps (BP-15-03, BP-15-04, or BP-15-05) are running, and the associated limit switch (ZS 15-03, ZS-15-04, or ZS-15-05) is made. When both booster pumps are shut down or a limit switch is not made, the chemical feed pump shall not operate. The speed of the pump shall be calculated using the following equations.
 3. There shall be an operator-adjustable "Speed Adjustment Time Delay" (0 to 600 seconds) such that after the PLC changes the speed of the pump, the PLC shall wait for the time delay to expire before changing the speed again.

$$C_{PPM} = D_{CFC} - C_{PS}$$

Where:

C_{PPM} = Chemical Feed Concentration (mg/L)
 D_{CFC} = Desired Chemical Feed Concentration (Operator Adjustable) (mg/L)
 C_{PS} = Pump Influent Chlorine Concentration (AIT-15-05) (mg/L)

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} \cdot \frac{S_{STR}}{S_{STR}}}$$

Where:

S_P = Pump Speed (%)
 Q_{MGD} = High Zone Booster Pump Flow (FIT-15-07) (MGD)
 C_{PPM} = Chemical Feed Concentration (Operator Adjustable) (mg/L)
 S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)
 Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (GPD)

- H. The Influent Orthophosphate Metering Pump (CP-15-04) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," the operator shall have the ability to select which flow meter (GPWC Influent FIT-15-06 or High Zone Influent FIT-15-09) shall be used for control of the pump. Indication of the selected flow meter shall be displayed at the SCADA System.
 - a. When the selected flow rises above an operator-adjustable minimum flow (0 to 100.0 gpm) setpoint, and the flow switch in the influent piping (FS-15-01) is made,

the chemical feed pump shall start and the speed shall be controlled by the PLC using the following equation.

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} S_{STR}}$$

Where:

S_P = Pump Speed (%)

Q_{MGD} = Influent Flow (FIT-15-06 or FIT-15-09) (mgd)

C_{PPM} = Chemical Feed Concentration (Operator Adjustable) (mg/L)

S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)

Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (gpd)

- b. When the selected flow is not above the minimum flow setpoint or the flow switch is not made, the chemical feed pump shall not operate. A flow fail alarm shall be indicated at the SCADA system if the flow switch is not activated.
- I. Door position switches on the exterior doors (ZS-15-06 through ZS-15-09, and ZS-30-01) shall be monitored at this PLC for intrusion alarm indication at the SCADA System. The intrusion alarm system shall be controlled from this PLC with SCADA "Enable" and "Disable" pushbuttons and a white, momentary, lighted pushbutton on the front door of this SCC. Do not provide a nameplate for this pushbutton.
 1. When the SCADA "Disable" pushbutton is pressed or when the system is enabled and the pushbutton on the front door of this SCADA panel is pressed, the intrusion alarm system shall be disabled. When the intrusion alarm system is disabled, the light on the pushbutton shall be illuminated continuously and all intrusion alarms shall be disabled.
 2. When the SCADA "Enable" pushbutton is pressed or when the system is disabled and the pushbutton on the front door of this SCADA panel is pressed, the light on the pushbutton shall turn off immediately and the intrusion alarm system shall be enabled after a hardcoded, 60-second time delay to allow anyone inside the building to exit without activating an intrusion alarm.
 3. If the intrusion alarm system is enabled and any of the door switches are activated and the intrusion alarm system is not disabled within a hardcoded, 60-second time delay, an intrusion alarm shall be activated. There shall be individual intrusion alarms for each door switch such that only the alarms for the door switches that were activated prior to the time delay expiring shall be activated.
 4. The enabled/disabled status of the intrusion alarm system shall be indicated at the SCADA System.
 - J. Provide a hazardous emergency control station (CS-15-02) for the chemical room with a red, maintained-type, mushroom-head emergency stop pushbutton that shall be monitored by this SCADA panel and the fire alarm control panel (FACP-15). When the control station pushbutton is pressed, the associated horn and strobes shall be energized. The horn and strobes shall remain energized until the control station pushbutton is reset. 120-volt power to the horns and strobes shall be from this SCADA panel and shall be fused. These controls shall be hardwired for failsafe operation and not through the PLC.

3.06 WEST RECEIVING STATION SCADA PANEL (SCC-20)

- A. Provide a new NEMA 12, PLC-based supervisory control center, sized a minimum of 24 inches and maximum of 36 inches wide by 16 inches deep by 48 inches high, suitable for

wall mounting where shown on the Drawings. All control algorithms and alarms described herein shall be programmed into this PLC. Provide space below or adjacent to the new PLC on the back panel within this SCC for a future I/O rack consisting of a power supply, Ethernet communication module, and four I/O cards.

- B. Influent Orthophosphate Metering Pump (CP-20-02) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," when the influent flow meter (FIT-20-01) rises above an operator-adjustable minimum flow (0 to 50.0 gpm) setpoint, and the flow switch in the influent piping (FS-20-01) is made, the chemical feed pump shall start and the speed shall be controlled by the PLC using the following equation.

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} * S_{STR}}$$

Where:

S_P = Pump Speed (%)
 Q_{MGD} = Influent Flow (FIT-20-01) (mgd)
 C_{PPM} = Chemical Feed Concentration (Operator Adjustable) (mg/L)
 S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)
 Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (gpd)

3. When the selected flow is not above the minimum flow setpoint or the flow switch is not made, the chemical feed pump shall not operate. A flow fail alarm shall be indicated at the SCADA system if the flow switch is not activated.

- C. The Influent Sodium Hypochlorite Metering Pump (CP-20-01) shall be controlled from this PLC with a SCADA Hand-Off-Auto switch as follows:
1. In SCADA "Hand," the pump shall start and run continuously at an operator-adjustable speed setpoint (0 to 100%).
 2. In SCADA "Auto," when the influent flow meter (FIT-20-01) rises above an operator-adjustable minimum flow (0 to 100.0 gpm) setpoint, and the flow switch in the influent piping (FS-20-01) is made, the chemical feed pump shall start and the speed shall be controlled by the PLC using the following equation.

$$S_P = \frac{Q_{MGD} * C_{PPM} * 8.34 \left(\frac{lb}{gal} \right)}{Q_{MAX} * S_{STR}}$$

Where:

S_P = Pump Speed (%)
 Q_{MGD} = Influent Flow (FIT-20-01) (mgd)
 C_{PPM} = Chemical Feed Concentration (Operator Adjustable) (mg/L)
 S_{STR} = Solution Strength (Operator Adjustable) (lb/gal)
 Q_{MAX} = Maximum Pump Flow (Operator Adjustable) (gpd)

3. When the selected flow is not above the minimum flow setpoint or the flow switch is not made, the chemical feed pump shall not operate. A flow fail alarm shall be indicated at the SCADA system if the flow switch is not activated.
- D. Door position switches on the exterior doors (ZS-20-01 and ZS-20-02) shall be monitored at this PLC for intrusion alarm indication at the SCADA System. The intrusion alarm system shall be controlled from this PLC with SCADA "Enable" and "Disable" pushbuttons and a white momentary, lighted pushbutton on the front door of this SCADA panel. Do not provide a nameplate for this pushbutton.
 1. When the SCADA "Disable" pushbutton is pressed or when the system is enabled and the pushbutton on the front door of this SCADA panel is pressed, the intrusion alarm system shall be disabled. When the intrusion alarm system is disabled, the light on the pushbutton shall be illuminated continuously and all intrusion alarms shall be disabled.
 2. When the SCADA "Enable" pushbutton is pressed or when the system is disabled and the pushbutton on the front door of this SCADA panel is pressed, the light on the pushbutton shall turn off immediately and the intrusion alarm system shall be enabled after a hardcoded, 60-second time delay to allow anyone inside the building to exit without activating an intrusion alarm.
 3. If the intrusion alarm system is enabled and any of the door switches are activated and the intrusion alarm system is not disabled within a hardcoded, 60-second time delay, an intrusion alarm shall be activated. There shall be individual intrusion alarms for each door switch such that only the alarms for the door switches that were activated prior to the time delay expiring shall be activated.
 4. The enabled/disabled status of the intrusion alarm system shall be indicated at the SCADA System.

3.07 POWER METERING ENCLOSURE

- A. Provide a NEMA 12, wall-mounted enclosure sized as needed where shown on the Drawings.
 1. Provide a power meter, touchscreen display, and current transformer shorting blocks as specified herein, and all fuse blocks, terminal blocks, control power transformers, and other accessories required for the power meter installation.
 2. Provide current transformers as specified herein for field installation in SWBD-15.
 3. Provide a 24-volt DC power supply to power the touchscreen display. Touchscreen display shall be mounted on the front door of the enclosure.
 4. Provide a three-phase voltage monitor as specified herein. System Supplier shall select the voltage to match the associated electrical service. The phase monitor inputs shall be wired in parallel with the power meter voltage sensing conductors.
 5. Power meter shall be powered from the voltage sensing inputs via a control power transformer.

3.08 TRANSMITTER CABLE JUNCTION BOXES

- A. Provide a junction box, sized as needed, where shown on the Drawings with terminal blocks for each cable associated with a transmitter. The junction box NEMA rating shall be as shown on the Drawings.

3.09 ON-SITE RADIO PATH SURVEY

- A. The System Supplier shall include in its bid an on-site radio path survey for each station using the radios and communication protocols specified herein. The radio path survey results shall include acceptable fade margins for all communication paths and shall be submitted to

ENGINEER for review. All unacceptable paths shall be resolved prior to the submittal of shop drawings. A sample radio path survey report is included in the Appendix.

- B. If Bid Alternative No. 1 is selected, radio path survey shall include all the well house sites in addition to the Base Bid receiving station site.

3.10 WELL 1 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 30 inches wide by 8 inches deep by 36 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, an NTron 105TX unmanaged network switch, an Allen-Bradley 2711P touchscreen, and a RAD130 Freewave FGR09CSU radio.
- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field-wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.
- C. Remove and replace the red "Intrusion Arm/Disarm" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. Remove and replace the Allen-Bradley OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.11 WELL 4 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 20 inches wide by 8 inches deep by 24 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, a Phoenix 2891152 unmanaged network switch, a Maple HMI5070NH touchscreen, and a Freewave FGR2-C-U Radio.
- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field-wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.
- C. Remove and replace the red "Entry" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. Remove and replace the Maple OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.12 WELL 7 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 30 inches wide by 8 inches deep by 30 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous

appurtenances, an N-Tron 708TX unmanaged network switch, a Maple HMI5100L touchscreen, a Freewave FGR2-C-U radio, and a Yagi MDS 97-3194A14 antenna.

- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.
- C. Remove and replace the red "Entry" pilot light on the front door of this enclosure with a red push-to-test LED pilot light. Remove and replace the white "Power On UPS" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. Remove and replace the Maple OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.13 WELL 8 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 20 inches wide by 8 inches deep by 24 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, a Phoenix 2891152 unmanaged network switch, a Maple HMI5070NH touchscreen, and a Freewave FGR2-C-U radio.
- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field-wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.
- C. Remove and replace the red "Entry" pilot light on the front door of this enclosure with a red push-to-test LED pilot light. Remove and replace the white "Power On UPS" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. Remove and replace the Maple OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.14 WELL 10 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 20 inches wide by 8 inches deep by 24 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, a Phoenix 2891152 unmanaged network switch, a Maple HMI5070NH touchscreen, and a Freewave FGR2-C-U radio.
- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.

- C. Remove and replace the red "Entry" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. Remove and replace the Maple OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.15 WELL 11 SCADA PANEL MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel that is 20 inches wide by 8 inches deep by 24 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, a Phoenix 2891152 unmanaged network switch, a Maple HMI5070NH touchscreen, and a Freewave FGR2-C-U radio.
- B. Remove the existing back panel in its entirety and all attached components, unless otherwise noted, and provide a completely new PLC-based back panel in the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the new PLC. The existing field wiring shall remain for reconnection to the new terminal blocks. Coordinate location of new field-wiring terminal blocks to accommodate existing field wiring conductor lengths and conduit penetrations into the existing enclosure.
- C. Remove and replace the red "Entry" pilot light on the front door of this enclosure with a red push-to-test LED pilot light.
- D. D. Remove and replace the Maple OIP on the front panel door with a new OIP as specified. Modify openings as required and provide a stainless steel plate to fill any annular space left after device removal.

3.16 WELL 9/12 SCADA PANEL AND CP-2 MODIFICATIONS (BID ALTERNATIVE NO. 1)

- A. There is an existing supervisory control panel (SCADA Panel) that is 24 inches wide by 8 inches deep by 30 inches high with a Micrologix 1400 PLC mounted on the back panel with miscellaneous appurtenances, a Phoenix 2891152 unmanaged network switch, a Allen-Bradley Router 1783-NATR, an Allen-Bradley PanelView touchscreen, and a Freewave FGR2-C-U radio.
- B. There is also an existing supervisory control panel (CP-2) that is 36 inches wide by 12 inches deep by 48 inches high with a CompactLogix L24ER PLC mounted on the back panel with an N-Tron 708TX network switch, and a PanelView Plus 1000 touch screen. The PLC in this panel includes programming related to filter and high service pump controls.
- C. Remove the existing SCADA Panel backpanel in its entirety and all attached components, and provide a new backpanel with terminal blocks for use with extending existing field wiring to CP-2.
- D. Provide additions and modifications to the existing CP-2 enclosure such that it becomes the primary SCADA Panel for the facility. The existing field wiring in the SCADA Panel shall be extended to new terminal blocks in CP-2. Coordinate location of new field wiring terminal blocks to accommodate conduit penetrations into the existing enclosure. All control algorithms and alarms in the existing PLC shall remain and be transferred to the CP-2 PLC.

3.17 TELEMETRY SYSTEM MASTER CONTROL PANEL (MASTER SCADA PANEL)

- A. Provide a new NEMA 12, wall-mounted, PLC-based supervisory control center, sized a minimum of 24 inches and maximum of 36 inches wide by 20 inches deep by 30 inches high, where shown on the Drawings. All control algorithms and alarms described herein shall be programmed into this PLC.
- B. All remote receiving station and well house I/O shall be monitored at the SCADA System through this PLC (Master Telemetry PLC) unless otherwise noted. Provide PLC programming, I/O cards, and control panel hardware as required to incorporate all control algorithms and alarms for the radio telemetry system as described herein. Refer to the I/O listing for all required I/O that shall interface with this control panel.
- C. Historical data for the remote sites, including pump runtimes and starts and minimum/maximum/average data for flows and levels as specified herein shall be collected at this PLC and not at the remote sites.

3.18 MODIFICATIONS TO EXISTING SCADA SYSTEM HMI GRAPHICS (BASE BID)

- A. Provide all programming required to modify the existing SCADA System HMI graphics , WIN-911 software alarm dialer, and XLReporter software to meet the requirements of these Specifications. The existing SCADA System HMI software is AVEVA InTouch and shall be upgraded to the latest version as specified herein. OWNER maintains an AVEVA support agreement, and it may be assumed that upgrades to current licenses will be at no cost.
- B. There are SCADA computers currently located at the East STP and the Public Works Department office. The SCADA computer at the East STP shall be decommissioned and the new main SCADA computer shall be set up at the East Receiving Station in the Office (Room 1505). The existing AVEVA InTouch license shall be moved from the decommissioned computer to the new computer.
- C. Remove or replace all existing information and controls associated with the equipment being removed or modified as part of this project with new controls and graphics to match the complexity and clarity of the existing SCADA System HMI graphics, where applicable. The existing HMI tag naming standard shall be strictly adhered to.
- D. Where existing HMI tags will be reused, the PLC tag linked to the HMI tag shall be updated to use the new PLC tag, where applicable. Remove all existing HMI tags associated with equipment being removed or modified that will not be reused.

3.19 MODIFICATIONS TO EXISTING SCADA SYSTEM HMI GRAPHICS, REPORTS, AND SOFTWARE ALARM DIALER (BID ALTERNATIVE NO. 1)

- A. Remove or replace all existing information and controls associated with the equipment being removed or modified at the remote sites as part of this project with new controls and graphics to match the complexity and clarity of the existing SCADA System HMI graphics, where applicable. The existing HMI tag naming standard shall be strictly adhered to.
- B. Where existing HMI tags will be reused, the PLC tag linked to the HMI tag shall be updated to use the new PLC tag, where applicable. Remove all existing HMI tags associated with equipment being removed or modified that will not be reused.

- C. Review and update all existing data points in the XL Reporter database and incorporate all new data to match existing database configuration. Review and update all existing alarm callouts in the WIN-911 software alarm dialer to match existing alarm configuration.

END OF SECTION

SECTION 26 09 10

CONTROLS AND INSTRUMENTATION DRAWINGS

PART 1-GENERAL

1.01 SUMMARY

- A. Work Included: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit drawings in accordance with provisions of Section 01 33 00–Submittals.

1.03 COORDINATION

- A. The requirements set forth in this section are intended to apply to the drawings provided as specified in Section 26 09 00–Controls and Instrumentation and Section 26 24 19–Motor Control.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A bound set of as-built drawings shall be provided in the associated equipment enclosure.
- B. All drawings shall have the following information:
 - 1. Project information, including name of OWNER and specific project name.
 - 2. Drawing title, accurately representing what is on the drawing.
 - 3. Unique drawing identifier, consisting of a unique drawing number or drawing number with individual sheet number. If sheet numbers are used, total number of sheets must be identified on each sheet.
 - 4. System Supplier company name, address, and phone number.
 - 5. Original design information, including person responsible for design, date of original design, person responsible for checking of design, and date of design check.
 - 6. Revision block indicating revision number, date, description of revision, and person responsible for revision.
- C. All drawings shall have line numbers that can be uniquely referenced from other drawings.
- D. All drawings showing wiring shall include unique wire numbers assigned to wiring that is installed between devices in the panel. The wire number shall be shown on the drawings.
- E. All drawings showing relays shall include reference to the drawings where the relay contacts are shown. Spare relay contacts that are not used shall be identified.

3.02 DRAWINGS REQUIRED

- A. Index of Drawings: Index of Drawings shall list drawing number, sheet number (if applicable), and drawing title for each drawing in drawing package.
- B. Symbol Sheet: Symbol Sheet shall include:
 - 1. Explanation of all symbols used on the drawings, including, but not limited to, normally open/normally closed contacts, flow switches, limit switches, pressure switches, selector switches, pushbuttons, timers, control relays, solenoids, fuses, circuit breakers, terminal blocks, and contactors. Symbol sheet does not need to be specific to project, but must contain explanation of all symbols used on the drawings (i.e., special symbols used for a particular project must be added to standard symbol sheets).
 - 2. List of abbreviations used on the drawings.
 - 3. Explanation of continuation method for circuits that cannot be shown on a single sheet.
- C. Exterior Enclosure Layout Drawing: Exterior layout drawing shall show location of all externally-mounted equipment. Exterior layout drawing shall include:
 - 1. Enclosure dimensions, enclosure NEMA rating (i.e., NEMA 1, NEMA 4X stainless steel, NEMA 4X nonmetallic, etc.), and enclosure color or finish.
 - 2. Location and actual depiction of panel latches, hinges, mounting holes and lifting eyes.
 - 3. Location and accurate representation of equipment mounted on enclosure (i.e., switches should look like actual switches being installed; indicating lights should look like actual lights being installed).
 - 4. Equipment nameplate location.
 - 5. Description for each piece of equipment or unique identifier and parts list, or bill of materials.
 - 6. Nameplate list including nameplate wording, size, construction (i.e., lamicoid with Black background and White letters), and mounting method (i.e., stainless steel screws). Label size must include size in inches or reference to standard sizes included on symbol sheet, or elsewhere in drawing package.
 - 7. Identification of area reserved for equipment located inside enclosure, but not actually mounted on enclosure back panel, such as UPSs, fiber optic patch panels, and lighting packages.
- D. Interior Enclosure Layout Drawing: Interior layout drawing shall show location of all internally-mounted equipment. Interior layout drawing shall include:
 - 1. Back panel dimensions and finish.
 - 2. Location and accurate representation of equipment (i.e., terminal blocks should look like actual terminal blocks; receptacle should look like actual receptacle, etc.).
 - 3. Dimensions of internally-mounted equipment are not necessary, but equipment should be drawn to scale such that an accurate representation of the way equipment will be mounted is shown on the drawing.
 - 4. Description for each piece of equipment or unique identifier and parts list, or bill of materials.
- E. Interconnection Diagram, Network Diagram or Block Diagram: Interconnection Diagram, Network Diagram or Block Diagram shall show all cabling between system components and identify any station addressing or node numbers that are assigned to equipment. All cables shall be identified by cable type, including specific manufacturer and model/part number. Party responsible for furnishing and installing cable shall also be included. Some examples of cables that must be shown are:

1. Antenna cables.
 2. Communications cables between system components (fiber and/or copper). This includes fiber optic jumpers between fiber patch panels and equipment, and Ethernet patch cables between switches and devices.
 3. Communications cables (fiber and/or copper) between PLCs, controllers, operator interface equipment that are not shown on the elementary schematics.
- F. Elementary Schematic: Elementary schematics shall be developed for each motor or supplied equipment and shall include:
1. Nominal voltage, AC or DC designation, number of phases (if AC), and frequency in hertz (if AC) for each source of electrical supply to the enclosure.
 2. Prospective short-circuit current available at the point of electrical supply to the enclosure.
 3. Type of power supply system grounding (e.g., wye phase midpoint grounded, delta phases corner grounded, wye phases midpoint grounded, delta phases ungrounded, etc.).
 4. Complete documentation of electrical circuit from supply to motor or supplied equipment. Documentation shall include disconnecting means, main overcurrent protection (when supplied), branch overcurrent protection (when supplied), control circuit and special purpose control protection, motor control, overload protection, local disconnect (when supplied) and motor horsepower, and full load amps from nameplate or supplied equipment full load amps.
 5. Documentation of PLC or controller inputs and outputs.
 6. Documentation of all circuit breaker/motor protector ratings, fuse sizes, control power transformer VA ratings, dip switch settings, etc.
 7. Documentation of all VFD settings (e.g., under-voltage shutdown, ramp time, overload, excessive starts/hour, etc.) which have been changed from the factory default setting.
- G. Wiring Diagram: Wiring diagrams shall show all terminations for all cables external to the enclosure. Terminations may be shown on the elementary schematics as long as the termination information is concise and easily understood by the personnel installing the field wiring. Termination information shall be shown for all devices, including devices that are not part of System Supplier's scope of supply. A box with two dots or continuation arrows indicating continuation to a piece of equipment are not acceptable. Information shown on System Supplier's wiring diagrams shall include a description of the drawings where terminations are found (i.e., drawing title), drawing number where the terminations are found, and terminal blocks referenced on the drawing. System Supplier shall coordinate with supplier of other wiring diagram to provide information on System Supplier's wiring diagrams.
- H. Calculations Summary: Calculations summary shall include calculations performed to:
1. Determine size of UPS.
 2. Determine air conditioning equipment requirement.
 3. Determine control power transformer sizing. Control power transformer sizing calculations may be generic based on typical circuits.
- I. Functional Testing Recommendations: Testing recommendations shall include description of functional tests that must be performed by operators. Functional test description shall be included for UPS, indicating lights, and other devices whose condition can only be determined by testing.

3.03 SAMPLE DRAWINGS

- A. Sample drawings showing an acceptable format are included in the appendix. The samples included in the appendix do not represent the only acceptable method of showing the required information.

END OF SECTION

SCADA SYSTEM I/O LISTING

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SCADA SYSTEM I/O LISTING - EAST RECEIVING STATION SCADA PANEL

SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCADA PANEL
15	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCADA PANEL
15	SCADA PANEL NETWORK SWITCH ALARM		1	0	0	0	2-#14	FROM NETWORK SWITCH IN THIS SCADA PANEL
15	COMMUNICATION FAIL PILOT LIGHT		0	1	0	0	2-#14	TO PILOT LIGHT ON FRONT OF THIS SCADA PANEL
15	NETWORK CABINET							
15	NETWORK SWITCH ALARM		1	0	0	0	2-#14	FROM NETWORK SWITCH IN NETWORK RACK
15	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN NETWORK RACK
15	SWBD-15 POWER FAIL		1	0	0	0	2-#14	FROM PHASE MONITOR IN PHASE MONITOR AND POWER METER ENCLOSURE
15	SE-ATS-15 MAIN CIRCUIT BREAKER ARMS ON		1	0	0	0	2-#14	FROM MAIN CIRCUIT BREAKER IN ATS
15	SWBD-15 POWER METER							
15	VOLTAGE		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	CURRENT		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	KVAR		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	KW		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	FREQUENCY		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	POWER FACTOR		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	TOTAL HARMONIC DISTORTION (VOLTAGE)		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	TOTAL HARMONIC DISTORTION (CURRENT)		0	0	X	0	ENET	FROM POWER METER IN ENCLOSURE
15	FIRE ALARM CONTROL PANEL	FACP-15						
15	TROUBLE		1	0	0	0	2-#14	FROM FIRE ALARM CONTROL PANEL
15	ALARM		1	0	0	0	2-#14	FROM FIRE ALARM CONTROL PANEL
15	WATER FLOW ALARM		1	0	0	0	2-#14	FROM FIRE ALARM CONTROL PANEL
15	SUPERVISORY		1	0	0	0	2-#14	FROM FIRE ALARM CONTROL PANEL
15	ACTIVE HARMONIC FILTER	HF-15-01						
15	RUNNING		X	0	0	0	ENET	FROM ACTIVE HARMONIC FILTER
15	POWER ON		X	0	0	0	ENET	FROM ACTIVE HARMONIC FILTER
15	FAULT		X	0	0	0	ENET	FROM ACTIVE HARMONIC FILTER
15	AT CURRENT LIMIT		X	0	0	0	ENET	FROM ACTIVE HARMONIC FILTER
15	INTRUSION DETECTION SYSTEM							
15	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	2-#14	FROM ILLUMINATED PUSHBUTTON ON THIS SCADA PANEL
15	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	2-#14	TO ILLUMINATED PUSHBUTTON ON THIS SCADA PANEL
15	NORTH PUMP ROOM DOOR STATUS	ZS-15-06	1	0	0	0	2-#14	FROM NORTH PUMP ROOM DOOR SWITCH
15	WEST PUMP ROOM DOOR STATUS	ZS-15-07	1	0	0	0	2-#14	FROM WEST PUMP ROOM DOOR SWITCH
15	CHEMICAL ROOM DOOR STATUS	ZS-15-08	1	0	0	0	2-#14	FROM CHEMICAL ROOM DOOR SWITCH

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SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	OFFICE DOOR STATUS	ZS-15-09	1	0	0	0	2-#14	FROM OFFICE DOOR SWITCH
15	RESERVOIR HATCH STATUS	ZS-30-01	1	0	0	0	2-#14	FROM RESERVOIR HATCH SWITCH
15	STANDBY GENERATOR							
15	RUNNING		1	0	0	0	2-#14	FROM GENERATOR CONTROL PANEL
15	FAILED		1	0	0	0	2-#14	FROM GENERATOR CONTROL PANEL
15	BATTERY CHARGER FAILED		1	0	0	0	2-#14	FROM BATTERY CHARGER
15	REMOTE E-STOP ACTIVATED		1	0	0	0	2-#14	FROM REMOTE EMERGENCY STOP PUSHBUTTON
15	AUTOMATIC TRANSFER SWITCH	SE-ATS-15						
15	IN NORMAL POSITION		1	0	0	0	2-#14	FROM AUTOMATIC TRANSFER SWITCH
15	IN EMERGENCY POSITION		1	0	0	0	2-#14	FROM AUTOMATIC TRANSFER SWITCH
15	SPD FAIL		1	0	0	0	2-#14	FROM SPD IN AUTOMATIC TRANSFER SWITCH
15	INFLUENT FLOW FAIL	FS-15-01	1	0	0	0	2-#14	FROM FLOW SWITCH
15	LOW ZONE BOOSTER PUMP NO. 1	BP-15-01						
15	IN AUTO		X	0	0	0	ENET	FROM HOA SWITCH ON VFD ENCLOSURE VIA VFD
15	RUNNING		X	0	0	0	ENET	FROM VFD
15	VFD FAULT		X	0	0	0	ENET	FROM VFD
15	MOTOR OVERTEMP		X	0	0	0	ENET	FROM MOTOR THERMOSTATS VIA VFD
15	START/STOP		0	X	0	0	ENET	TO VFD
15	AMPS		0	0	X	0	ENET	FROM VFD
15	KW		0	0	X	0	ENET	FROM VFD
15	SPEED FEEDBACK		0	0	X	0	ENET	FROM VFD
15	SPEED CONTROL		0	0	0	X	ENET	TO VFD
15	FLOW FAIL	ZS-15-01	X	0	0	0	ENET	FROM LIMIT SWITCH VIA VFD ENCLOSURE
15	PUMP FLOW	FT-15-01						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	LOW ZONE BOOSTER PUMP NO. 2	BP-15-02						
15	IN AUTO		X	0	0	0	ENET	FROM HOA SWITCH ON VFD ENCLOSURE VIA VFD
15	RUNNING		X	0	0	0	ENET	FROM VFD
15	VFD FAULT		X	0	0	0	ENET	FROM VFD
15	MOTOR OVERTEMP		X	0	0	0	ENET	FROM MOTOR THERMOSTATS VIA VFD
15	START/STOP		0	X	0	0	ENET	TO VFD
15	AMPS		0	0	X	0	ENET	FROM VFD
15	KW		0	0	X	0	ENET	FROM VFD
15	SPEED FEEDBACK		0	0	X	0	ENET	FROM VFD
15	SPEED CONTROL		0	0	0	X	ENET	TO VFD
15	FLOW FAIL	ZS-15-02	X	0	0	0	ENET	FROM LIMIT SWITCH VIA VFD ENCLOSURE

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SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	PUMP FLOW	FIT-15-02						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	HIGH ZONE BOOSTER PUMP NO. 1	BP-15-03						
15	IN AUTO		X	0	0	0	ENET	FROM HOA SWITCH ON VFD ENCLOSURE VIA VFD
15	RUNNING		X	0	0	0	ENET	FROM VFD
15	VFD FAULT		X	0	0	0	ENET	FROM VFD
15	MOTOR OVERTEMP		X	0	0	0	ENET	FROM MOTOR THERMOSTATS VIA VFD
15	START/STOP		0	X	0	0	ENET	TO VFD
15	AMPS		0	0	X	0	ENET	FROM VFD
15	KW		0	0	X	0	ENET	FROM VFD
15	SPEED FEEDBACK		0	0	X	0	ENET	FROM VFD
15	SPEED CONTROL		0	0	0	X	ENET	TO VFD
15	FLOW FAIL	ZS-15-03	X	0	0	0	ENET	FROM LIMIT SWITCH VIA VFD ENCLOSURE
15	PUMP FLOW	FIT-15-03						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	HIGH ZONE BOOSTER PUMP NO. 2	BP-15-04						
15	IN AUTO		X	0	0	0	ENET	FROM HOA SWITCH ON VFD ENCLOSURE VIA VFD
15	RUNNING		X	0	0	0	ENET	FROM VFD
15	VFD FAULT		X	0	0	0	ENET	FROM VFD
15	MOTOR OVERTEMP		X	0	0	0	ENET	FROM MOTOR THERMOSTATS VIA VFD
15	START/STOP		0	X	0	0	ENET	TO VFD
15	AMPS		0	0	X	0	ENET	FROM VFD
15	KW		0	0	X	0	ENET	FROM VFD
15	SPEED FEEDBACK		0	0	X	0	ENET	FROM VFD
15	SPEED CONTROL		0	0	0	X	ENET	TO VFD
15	FLOW FAIL	ZS-15-04	X	0	0	0	ENET	FROM LIMIT SWITCH VIA VFD ENCLOSURE
15	PUMP FLOW	FIT-15-04						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	HIGH ZONE BOOSTER PUMP NO. 3	BP-15-05						
15	IN AUTO		X	0	0	0	ENET	FROM HOA SWITCH ON VFD ENCLOSURE VIA VFD
15	RUNNING		X	0	0	0	ENET	FROM VFD
15	VFD FAULT		X	0	0	0	ENET	FROM VFD
15	MOTOR OVERTEMP		X	0	0	0	ENET	FROM MOTOR THERMOSTATS VIA VFD
15	START/STOP		0	X	0	0	ENET	TO VFD

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SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	AMPS		0	0	X	0	ENET	FROM VFD
15	KW		0	0	X	0	ENET	FROM VFD
15	SPEED FEEDBACK		0	0	X	0	ENET	FROM VFD
15	SPEED CONTROL		0	0	0	X	ENET	TO VFD
15	FLOW FAIL	ZS-15-05	X	0	0	0	ENET	FROM LIMIT SWITCH VIA VFD ENCLOSURE
15	PUMP FLOW	FIT-15-05						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	INFLUENT CHLORINE METERING PUMP	CP-15-01						
15	RUNNING		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FAILED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLUID RECOVERY		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	LEAK DETECTED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLOW PACE		0	0	0	1	SH. PR.	TO CHLORINE FEED PUMP
15	LOW ZONE CHLORINE METERING PUMP	CP-15-02						
15	RUNNING		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FAILED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLUID RECOVERY		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	LEAK DETECTED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLOW PACE		0	0	0	1	SH. PR.	TO CHLORINE FEED PUMP
15	HIGH ZONE CHLORINE METERING PUMP	CP-15-03						
15	RUNNING		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FAILED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLUID RECOVERY		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	LEAK DETECTED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
15	FLOW PACE		0	0	0	1	SH. PR.	TO CHLORINE FEED PUMP
15	INFLUENT ORTHOPHOSPHATE METERING PUMP	CP-15-04						
15	RUNNING		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
15	FAILED		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
15	FLUID RECOVERY		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
15	LEAK DETECTED		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
15	FLOW PACE		0	0	0	1	SH. PR.	TO ORTHOPHOSPHATE FEED PUMP
15	CHEMICAL ROOM EXHAUST FAN	EF-15-01						
15	RUNNING		1	0	0	0	2-#14	FROM CURRENT SWITCH VIA VFE-15-01
15	MANUAL VENTILATION SHUTDOWN	CS-15-01	1	0	0	0	2-#14	FROM CONTROL STATION
15	CHEMICAL ROOM SUPPLY FAN RUNNING	SF-15-01	1	0	0	0	2-#14	FROM CURRENT SWITCH VIA VFE-15-01
15	PUMP ROOM EXHAUST FAN	EF-15-02						

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SCADA SYSTEM I/O LISTING - EAST RECEIVING STATION SCADA PANEL

SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	RUNNING		1	0	0	0	2-#14	FROM VFD IN MOTOR ENCLOSURE VIA VFE-15-02
15	FAULT		1	0	0	0	2-#14	FROM VFD IN MOTOR ENCLOSURE VIA VFE-15-02
15	START/STOP		0	1	0	0	2-#14	TO VFD IN MOTOR ENCLOSURE VIA VFE-15-02
15	INFLUENT PRESSURE	PIT-15-01	0	0	1	0	SH. PR.	FROM PRESSURE TRANSMITTER
15	GPWC SUPPLY FLOW	FIT-15-06						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	HIGH ZONE DISCHARGE FLOW	FIT-15-07						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	LOW ZONE DISCHARGE PRESSURE	PIT-15-02	0	0	1	0	SH. PR.	FROM PRESSURE TRANSMITTER
15	LOW ZONE DISCHARGE FLOW	FIT-15-08						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	HIGH ZONE DISCHARGE PRESSURE	PIT-15-03	0	0	1	0	SH. PR.	FROM PRESSURE TRANSMITTER
15	HIGH ZONE INFLUENT FLOW	FIT-15-09						
15	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
15	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
15	GPWC CHLORINE CONCENTRATION	AIT-15-01	0	0	1	0	SH. PR.	FROM CHLORINE ANALYZER
15	LOW ZONE CHLORINE CONCENTRATION	AIT-15-02	0	0	1	0	SH. PR.	FROM CHLORINE ANALYZER
15	HIGH ZONE CHLORINE CONCENTRATION	AIT-15-03	0	0	1	0	SH. PR.	FROM CHLORINE ANALYZER
15	ORTHOPHOSPHATE CONCENTRATION	AIT-15-04	0	0	1	0	SH. PR.	FROM ORTHOPHOSPHATE ANALYZER
15	CHLORINE BULK TANK LEVEL	LT-15-01	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	ORTHOPHOSPHATE BULK TANK LEVEL	LT-15-02	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	CHLORINE DAY TANK NO. 1 LEVEL	LT-15-03	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	CHLORINE DAY TANK NO. 2 LEVEL	LT-15-04	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	CHLORINE DAY TANK NO. 3 LEVEL	LT-15-05	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	ORTHOPHOSPHATE DAY TANK LEVEL	LT-15-06	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	RESERVOIR LEVEL	PIT-30-01	0	0	1	0	SH. PR.	FROM PRESSURE TRANSMITTER
15	BACKUP RESERVOIR LEVEL	LT-30-01	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
15	PRV CONTROLLER	FCV-15-01						
15	VALVE NOT OPENING		1	0	0	0	2-#14	FROM VALVE CONTROLLER
15	AUTO MODE		0	1	0	0	2-#14	TO VALVE CONTROLLER
15	OPEN		0	1	0	0	2-#14	TO VALVE CONTROLLER
15	CLOSE		0	1	0	0	2-#14	TO VALVE CONTROLLER
15	RESERVOIR OK TO FILL		0	1	0	0	2-#14	TO VALVE CONTROLLER
15	RESERVOIR FULL		0	1	0	0	2-#14	TO VALVE CONTROLLER

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SCADA SYSTEM I/O LISTING - EAST RECEIVING STATION SCADA PANEL

SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
15	VALVE POSITION FEEDBACK	ZT-15-01	0	0	1	0	SH. PR.	FROM POSITION TRANSMITTER VIA VALVE CONTROLLER
15	RESERVOIR FILL FLOW SETPOINT		0	0	0	1	SH. PR.	TO VALVE CONTROLLER
15	GWPC SUPPLY FLOW	FIT-15-06	0	0	0	1	SH. PR.	TO VALVE CONTROLLER
	TOTALS		56	8	25	6		

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SCADA SYSTEM I/O LISTING - WEST RECEIVING SCADA PANEL

SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
20	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCADA PANEL
20	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCADA PANEL
20	NETWORK SWITCH ALARM		1	0	0	0	2-#14	FROM NETWORK SWITCH IN THIS SCADA PANEL
20	COMMUNICATION FAIL PILOT LIGHT		0	1	0	0	2-#14	TO PILOT LIGHT ON FRONT OF THIS SCADA PANEL
20	NETWORK CABINET							
20	NETWORK SWITCH ALARM		1	0	0	0	2-#14	FROM NETWORK SWITCH IN NETWORK RACK
20	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN NETWORK RACK
20	STANDBY GENERATOR							
20	RUNNING		1	0	0	0	2-#14	FROM GENERATOR CONTROL PANEL
20	FAILED		1	0	0	0	2-#14	FROM GENERATOR CONTROL PANEL
20	BATTERY CHARGER FAILED		1	0	0	0	2-#14	FROM BATTERY CHARGER
20	REMOTE E-STOP ACTIVATED		1	0	0	0	2-#14	FROM REMOTE EMERGENCY STOP PUSHBUTTON
20	AUTOMATIC TRANSFER SWITCH	SE-ATS-20						
20	IN NORMAL POSITION		1	0	0	0	2-#14	FROM AUTOMATIC TRANSFER SWITCH
20	IN EMERGENCY POSITION		1	0	0	0	2-#14	FROM AUTOMATIC TRANSFER SWITCH
20	SPD FAIL		1	0	0	0	2-#14	FROM SPD IN AUTOMATIC TRANSFER SWITCH
20	INFLUENT PRESSURE	PIT-20-01	0	0	1	0	SH. PR.	FROM PRESSURE TRANSMITTER
20	INFLUENT FLOW	FIT-20-01						
20	INSTANTANEOUS		0	0	1	0	SH. PR.	FROM FLOW METER TRANSMITTER
20	TOTALIZED		1	0	0	0	2-#14	FROM FLOW METER TRANSMITTER
20	INFLUENT FLOW FAIL	FS-20-01	1	0	0	0	2-#14	FROM FLOW SWITCH
20	INTRUSION DETECTION SYSTEM							
20	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	2-#14	FROM ILLUMINATED PUSHBUTTON ON THIS SCADA PANEL
20	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	2-#14	TO ILLUMINATED PUSHBUTTON ON THIS SCADA PANEL
20	METER ROOM DOOR STATUS	ZS-20-01	1	0	0	0	2-#14	FROM METER ROOM DOOR SWITCH
20	CHEMICAL ROOM DOOR STATUS	ZS-20-02	1	0	0	0	2-#14	FROM CHEMICAL ROOM DOOR SWITCH
20	SODIUM HYPOCHLORITE BULK TANK LEVEL	LT-20-01	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
20	ORTHOPHOSPHATE DAY TANK LEVEL	LT-20-02	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
20	SODIUM HYPOCHLORITE DAY TANK LEVEL	LT-20-03	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
20	CHLORINE METERING PUMP	CP-20-01						
20	RUNNING		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
20	FAILED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
20	FLUID RECOVERY		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
20	LEAK DETECTED		1	0	0	0	2-#14	FROM CHLORINE FEED PUMP
20	FLOW PACE		0	0	0	1	SH. PR.	TO CHLORINE FEED PUMP
20	ORTHOPHOSPHATE METERING PUMP	CP-20-02						

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SCADA PANEL	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
20	RUNNING		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
20	FAILED		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
20	FLUID RECOVERY		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
20	LEAK DETECTED		1	0	0	0	2-#14	FROM ORTHOPHOSPHATE FEED PUMP
20	FLOW PACE		0	0	0	1	SH. PR.	TO ORTHOPHOSPHATE FEED PUMP
20	CHLORINE CONCENTRATION	AIT-20-01	0	0	1	0	SH. PR.	FROM CHEMICAL ANALYZER
20	CHEMICAL ROOM EXHAUST FAN RUNNING	EF-20-01	1	0	0	0	2-#14	FROM CURRENT SWITCH VIA VFE-20-01
20	CHEMICAL ROOM SUPPLY FAN RUNNING	SF-20-01	1	0	0	0	2-#14	FROM CURRENT SWITCH VIA VFE-20-01
20	METER ROOM EXHAUST FAN RUNNING	EF-20-03	1	0	0	0	2-#14	FROM CURRENT SWITCH VIA VFE-20-02
	TOTALS		28	2	6	2		

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SCADA SYSTEM I/O LISTING - WELL 1 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC
	GENERATOR							
	RUNNING		1	0	0	0	EXISTING	FROM GENERATOR VIA ATS
	FAILED		1	0	0	0	EXISTING	FROM GENERATOR VIA ATS
	AUTOMATIC TRANSFER SWITCH							
	NORMAL		1	0	0	0	EXISTING	FROM GENERATOR VIA ATS
	IN STANDBY		1	0	0	0	EXISTING	FROM GENERATOR VIA ATS
	INTRUSION DETECTION SYSTEM							
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC
	ELECTRICAL ROOM DOOR STATUS**	ZS-1	1	0	0	0	2-#14	FROM DOOR SWITCH
	SAMPLE ROOM DOOR STATUS**	ZS-2	1	0	0	0	2-#14	FROM DOOR SWITCH
	CHEMICAL ROOM DOOR STATUS**	ZS-3	1	0	0	0	2-#14	FROM DOOR SWITCH
	WELL 1							
	IN HAND		1	0	0	0	EXISTING	FROM HOA SWITCH ON THIS SCC
	IN AUTO		1	0	0	0	EXISTING	FROM HOA SWITCH ON THIS SCC
	START/STOP		0	1	0	0	EXISTING	TO VFD
	RUNNING		1	0	0	0	EXISTING	FROM VFD
	WASTE VALVE CLOSE SOLENOID		0	1	0	0	EXISTING	TO SOLENOID VALVE
	VFD FAULT**		1	0	0	0	2-#14	FROM VFD
	FLOW	FIT-1	0	0	1	0	EXISTING	FROM FLOW TRANSMITTER
	LEVEL		0	0	1	0	EXISTING	FROM PRESSURE TRANSMITTER
	TOWER LEVEL	PT-1	0	0	1	0	EXISTING	FROM PRESSURE TRANSMITTER
	ELECTRICAL ROOM							
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	SAMPLE ROOM							
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	CHEMICAL ROOM							
	FLOOD**	LS-1	1	0	0	0	2-#14	FROM FLOAT SWITCH
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	SODIUM HYPOCHLORITE							

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SCADA SYSTEM I/O LISTING - WELL 1 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	BULK TANK LEVEL**	LT-1	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	SPEED COMMAND**		0	0	0	1	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	FLUORIDE							
	BULK TANK LEVEL**	LT-2	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-5	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	SPEED COMMAND**		0	0	0	1	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	BULK TANK LEVEL**	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	SPEED COMMAND**		0	0	0	1	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TOTALS		12	0	6	3		

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SCADA SYSTEM I/O LISTING - WELL NO. 4 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC
	GENERATOR							
	RUNNING		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	FAILED		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	AUTOMATIC TRANSFER SWITCH							
	NORMAL		1	0	0	0	FUTURE	FROM FUTURE ATS
	IN STANDBY		1	0	0	0	FUTURE	FROM FUTURE ATS
	INTRUSION DETECTION SYSTEM							
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC
	TREATMENT ROOM DOOR STATUS**	ZS-2	1	0	0	0	2-#14	FROM DOOR SWITCH
	CHEMICAL ROOM DOOR STATUS**	ZS-1	1	0	0	0	2-#14	FROM DOOR SWITCH
	WELL							
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER
	START/STOP		0	1	0	0	EXISTING	TO WELL PUMP STARTER
	LEVEL**		0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FLOW		0	0	1	0	EXISTING	FROM FLOW TRANSMITTER
	SYSTEM FLOW		0	0	1	0	EXISTING	FROM FLOW TRANSMITTER
	HIGH SERVICE PUMP							
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	RUNNING		1	0	0	0	EXISTING	FROM VFD
	CHEMICAL ROOM							
	FLOOD**	LS-1	1	0	0	0	2-#14	FROM FLOAT SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	LOW TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	CHLORINE LEAK		1	0	0	0	EXISTING	FROM CHLORINE LEAK DETECTOR
	PRE-CHLORINATION							
	BULK TANK LEVEL**	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-1	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	SPEED COMMAND**		0	0	0	0	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	POST-CHLORINATION							
	BULK TANK LEVEL**	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER

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SCADA SYSTEM I/O LISTING - WELL NO. 4 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	DAY TANK LEVEL	LT-2	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	SPEED COMMAND**		0	0	0	1	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	POLY-PHOSPHATE							
	BULK TANK WEIGHT		0	0	1	0	EXISTING	FROM SCALE
	FLUORIDE							
	BULK TANK WEIGHT		0	0	1	0	EXISTING	FROM SCALE
	FEED PUMP							
	SPEED COMMAND**		0	0	0	1	SH. PR.	FROM CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TREATMENT ROOM							
	FLOOD	FS-2	1	0	0	0	2-#14	FROM FLOAT SWITCH
	MOTION DETECTED		1	0	0	0	2-#14	FROM MOTION SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	LOW ROOM TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	FILTER CONTROL PANEL							
	IN ALARM		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IN BACKWASH**		1	0	0	0	2-#14	FROM FILTER CONTROL PANEL
	HIGH FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	LOW FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	TOTALS	27	2	11	3			

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SCADA SYSTEM I/O LISTING - WELL NO. 7 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS	
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC	
	COMMUNICATION FAIL		1	0	0	0	2-#14	FROM RELAY IN THIS PANEL	
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC	
	INTRUSION DETECTION SYSTEM								
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC	
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC	
	ELECTRICAL ROOM DOOR SWITCH	ZS-1	1	0	0	0	EXISTING	FROM DOOR SWITCH	
	BATHROOM DOOR SWITCH	ZS-2	1	0	0	0	EXISTING	FROM DOOR SWITCH	
	CHEMICAL SAMPLE ROOM DOOR SWITCH	ZS-3	1	0	0	0	EXISTING	FROM DOOR SWITCH	
	CHEMICAL STORAGE ROOM DOOR SWITCH	ZS-4	1	0	0	0	EXISTING	FROM DOOR SWITCH	
	AUTOMATIC TRANSFER SWITCH								
	IN STANDBY**		1	0	0	0	2-#14	FROM ATS	
	IN NORMAL **		1	0	0	0	2-#14	FROM ATS	
	CURRENT**		0	0	1	0	SH. PR.	FROM CT IN ATS	
	GENERATOR								
	RUNNING**		1	0	0	0	2-#14	FROM GENERATOR	
	FAILED**		1	0	0	0	2-#14	FROM GENERATOR	
	WELL 7								
	IN HAND		1	0	0	0	EXISTING	FROM HOA SWITCH ON THIS SCC	
	IN AUTO		1	0	0	0	EXISTING	FROM HOA SWITCH ON THIS SCC	
	RUNNING		1	0	0	0	EXISTING	FROM VFD	
	WASTE VALVE CLOSE SOLENOID		0	1	0	0	EXISTING	TO SOLENOID VALVE	
	START/STOP		0	1	0	0	EXISTING	TO VFD	
	VFD FAULT		1	0	0	0	EXISTING	FROM VFD	
	SPEED CONTROL		0	0	0	1	EXISTING	TO VFD	
	SPEED FEEDBACK		0	0	1	0	EXISTING	FROM VFD	
	FLOW		0	0	1	0	EXISTING	FROM FLOW TRANSMITTER	
	DISCHARGE PRESSURE		0	0	1	0	EXISTING	FROM PRESSURE METER	
	LEVEL		0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER	
	ELECTRICAL ROOM								
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT	
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR	
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH	
	BATHROOM								
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT	
	FLOOD**		1	0	0	0	2-#14	FROM FLOAT SWITCH	
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR	
	CHEMICAL SAMPLE ROOM								

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH
	FLUORIDE TANK LEVEL		0	0	1	0	EXISTING	FROM LEVEL LIT-10-03
	CHEMICAL STORAGE ROOM							
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH
	SODIUM HYPOCHLORITE							
	BULK TANK LEVEL	LT-1	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL **	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	FLUORIDE							
	BULK TANK LEVEL	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL **	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	BULK TANK LEVEL	LT-2	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-5	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	CHLORINE							
	RESIDUAL**		0	0	1	0	SH. PR.	FROM CHLORINE ANALYZER
	PH**		0	0	1	0	SH. PR.	FROM CHLORINE ANALYZER
	TOTALS		31	6	14	4		

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SCADA SYSTEM I/O LISTING - WELL NO. 8 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	FROM UPS IN THIS SCC	COMMENTS
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC	
	3-PHASE POWER FAIL **		1	0	0	0	2-#14	UNKNOWN	
	COMMUNICATION FAIL		1	0	0	0	2-#14	FROM RELAY IN THIS PANEL	
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC	
	INTRUSION DETECTION SYSTEM								
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC	
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC	
	ELECTRICAL ROOM EAST DOOR SWITCH**	ZS-1	1	0	0	0	2-#14	FROM DOOR SWITCH	
	ELECTRICAL ROOM WEST DOOR SWITCH**	ZS-2	1	0	0	0	2-#14	FROM DOOR SWITCH	
	CHEMICAL ROOM DOOR SWITCH**	ZS-3	1	0	0	0	2-#14	FROM DOOR SWITCH	
	WELL 8								
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL	
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL	
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER	
	START/STOP		0	1	0	0	EXISTING	TO WELL	
	LEVEL		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER	
	RAW FLOW		0	0	1	0	EXISTING	FROM FLOW METER	
	FINISHED FLOW		0	0	1	0	EXISTING	FROM FLOW METER	
	TOWER LEVEL		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER	
	HIGH SERVICE PUMP								
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL	
	RUNNING		1	0	0	0	EXISTING	FROM VFD	
	ELECTRICAL ROOM								
	MOTION DETECTED**		1	0	0	0	2-#14	FROM MOTION SENSOR	
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT	
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR	
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH	
	CHEMICAL ROOM								
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT	
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR	
	FLOOD	LS-1	1	0	0	0	2-#14	FROM FLOAT SWITCH	
	PRE-CHLORINATION								
	BULK TANK LEVEL **	LT-5	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER	
	DAY TANK LEVEL	LT-1	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER	
	FEED PUMP								
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP	
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP	
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP	

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	POST-CHLORINATION							
	BULK TANK LEVEL**	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-2	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	FLUORIDE							
	BULK TANK LEVEL**	LT-7	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-3	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	BULK TANK WEIGHT		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TREATMENT ROOM							
	FLOOD	LS-2	1	0	0	0	2-#14	FROM FLOAT SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	LOW ROOM TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	FILTER CONTROL PANEL							
	IN ALARM		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IN BACKWASH**		1	0	0	0	2-#14	FROM FILTER CONTROL PANEL
	HIGH FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	LOW FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	TOTALS		30	6	13	4		

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SCADA SYSTEM I/O LISTING - WELL NO. 10 SCADA PANEL

SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC
	COMMUNICATION FAIL		1	0	0	0	2-#14	FROM RELAY IN THIS PANEL
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC
	INTRUSION DETECTION SYSTEM							
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC
	BOOSTER PUMP ROOM DOOR SWITCH	ZS-1	1	0	0	0	EXISTING	FROM DOOR SWITCH
	TREATMENT ROOM DOOR SWITCH	ZS-2	1	0	0	0	EXISTING	FROM DOOR SWITCH
	CHEMICAL ROOM DOOR SWITCH	ZS-3	1	0	0	0	EXISTING	FROM DOOR SWITCH
	GENERATOR							
	RUNNING		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	FAILED		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	AUTOMATIC TRANSFER SWITCH							
	NORMAL		1	0	0	0	FUTURE	FROM FUTURE ATS
	IN STANDBY		1	0	0	0	FUTURE	FROM FUTURE ATS
	WELL 10							
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER
	START/STOP		0	1	0	0	EXISTING	TO WELL PUMP STARTER
	SYSTEM PRESSURE		0	0	1	0	EXISTING	FROM PRESSURE TRANSMITTER
	RAW FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	FINISHED FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	ZONE TO ZONE BOOSTER FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	HIGH SERVICE PUMP							
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	RUNNING**		1	0	0	0	2-#14	FROM VFD
	OVERTEMP**		1	0	0	0	2-#14	FROM VFD
	BOOSTER PUMP ROOM							
	MOTION DETECTED**		1	0	0	0	2-#14	FROM MOTION SENSOR
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD		1	0	0	0	EXISTING	FROM FLOAT SWITCH
	BOOSTER PUMP							
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	RUNNING		1	0	0	0	EXISTING	FROM VFD

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	OVERTEMP**		1	0	0	0	2-#14	FROM VFD
	SPEED CONTROL **		0	0	0	1	EXISTING	TO VFD
	START/STOP		0	1	0	0	EXISTING	TO VFD
	ZONE TO ZONE FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	CHEMICAL ROOM							
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD	LS-1	1	0	0	0	2-#14	FROM FLOAT SWITCH
	PRE-CHLORINATION							
	BULK TANK LEVEL**	LT-5	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-1	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK **		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	POST-CHLORINATION							
	BULK TANK LEVEL**	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL**	LT-2	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	FLUORIDE							
	TANK LEVEL **	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	TANK LEVEL **	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TREATMENT ROOM							
	FLOOD	LS-2	1	0	0	0	2-#14	FROM FLOAT SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	LOW ROOM TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	FILTER CONTROL PANEL							
	IN ALARM		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IN BACKWASH**		1	0	0	0	2-#14	FROM FILTER CONTROL PANEL
	HIGH FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	LOW FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	HIGH SERVICE PUMP							
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	RUNNING		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	OVERTEMP**		1	0	0	0	EXISTING	FROM HSP CONTROLS
	TOTALS		41	7	12	5		

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC
	GENERATOR							
	RUNNING		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	FAILED		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	AUTOMATIC TRANSFER SWITCH							
	NORMAL		1	0	0	0	EXISTING	FROM ATS
	IN STANDBY		1	0	0	0	EXISTING	FROM ATS
	INTRUSION DETECTION SYSTEM							
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC
	TREATMENT ROOM DOOR STATUS**	ZS-2	1	0	0	0	2-#14	FROM DOOR SWITCH
	CHEMICAL ROOM DOOR STATUS**	ZS-1	1	0	0	0	2-#14	FROM DOOR SWITCH
	FILTER ROOM DOOR STATUS**	ZS-3	1	0	0	0	2-#14	FROM DOOR SWITCH
	STATEVILLE TOWER LEVEL		0	0	1	0	EXISTING	FROM PRESSURE TRANSMITTER
	WELL 11							
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER
	START/STOP		0	1	0	0	EXISTING	TO WELL PUMP STARTER
	FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	HIGH SERVICE PUMP							
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	RUNNING		1	0	0	0	EXISTING	FROM VFD
	ELECTRICAL ROOM							
	MOTION DETECTED**		1	0	0	0	2-#14	FROM MOTION SENSOR
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD	LS-1	1	0	0	0	EXISTING	FROM FLOAT SWITCH
	PRE-CHLORINATION							
	BULK TANK LEVEL**	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-2	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	POST-CHLORINATION							

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	BULK TANK LEVEL**	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-1	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	CHEMICAL ROOM							
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD	LS-2	1	0	0	0	EXISTING	FROM FLOAT SWITCH
	FLUORIDE							
	BULK TANK LEVEL**	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-5	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	TANK WEIGHT		0	0	1	0	EXISTING	FROM SCALE
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TREATMENT ROOM							
	FLOOD	LS-3	1	0	0	0	2-#14	FROM FLOAT SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	LOW ROOM TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	FILTER CONTROL PANEL							
	IN ALARM		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IN BACKWASH**		1	0	0	0	2-#14	FROM FILTER CONTROL PANEL
	HIGH FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	LOW FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	TOTALS		32	6	10	4		

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	CONTROL POWER FAIL		1	0	0	0	2-#14	FROM CONTROL POWER FAIL RELAY IN THIS SCC
	COMMON UPS ALARM		1	0	0	0	2-#14	FROM UPS IN THIS SCC
	GENERATOR							
	RUNNING		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	FAILED		1	0	0	0	FUTURE	FROM FUTURE GENERATOR
	AUTOMATIC TRANSFER SWITCH							
	NORMAL		1	0	0	0	EXISTING	FROM ATS
	IN STANDBY		1	0	0	0	EXISTING	FROM ATS
	INTRUSION DETECTION SYSTEM							
	ENABLE/DISABLE PUSHBUTTON		1	0	0	0	EXISTING	FROM ILLUMINATED PUSHBUTTON ON THIS SCC
	SYSTEM DISABLED PILOT LIGHT		0	1	0	0	EXISTING	TO ILLUMINATED PUSHBUTTON ON THIS SCC
	TREATMENT ROOM DOOR STATUS**	ZS-2	1	0	0	0	2-#14	FROM DOOR SWITCH
	CHEMICAL ROOM DOOR STATUS**	ZS-1	1	0	0	0	2-#14	FROM DOOR SWITCH
	FILTER ROOM DOOR STATUS**	ZS-3	1	0	0	0	2-#14	FROM DOOR SWITCH
	TOWER LEVEL		0	0	1	0	EXISTING	FROM PRESSURE TRANSMITTER
	WELL PUMPS							
	IN AUTO		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	IN HAND		1	0	0	0	EXISTING	FROM SELECTOR SWITCH ON THIS PANEL
	START/STOP		0	1	0	0	EXISTING	TO WELL CONTROLS
	WELL 9							
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER
	LEVEL		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FLOW		0	0	1	0	FUTURE	FROM FLOW METER
	WELL 12							
	RUNNING		1	0	0	0	EXISTING	FROM WELL PUMP STARTER
	LEVEL		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FLOW		0	0	1	0	FUTURE	FROM FLOW METER
	HIGH SERVICE PUMPS							
	CALLED TO RUN		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	PUMP 1 RUNNING	HSP-1	1	0	0	0	EXISTING	FROM VFD
	PUMP 2 RUNNING	HSP-2	1	0	0	0	EXISTING	FROM VFD
	ELECTRICAL ROOM							
	MOTION DETECTED**		1	0	0	0	2-#14	FROM MOTION SENSOR
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD	LS-1	1	0	0	0	EXISTING	FROM FLOAT SWITCH
	PRE-CHLORINATION							

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	BULK TANK LEVEL**	LT-4	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-2	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	POST-CHLORINATION							
	BULK TANK LEVEL**	LT-3	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-1	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	CHEMICAL ROOM							
	LOW TEMPERATURE		1	0	0	0	EXISTING	FROM THERMOSTAT
	SMOKE DETECTED		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	FLOOD	LS-2	1	0	0	0	EXISTING	FROM FLOAT SWITCH
	FLUORIDE							
	BULK TANK LEVEL**	LT-6	0	0	1	0	SH. PR.	FROM LEVEL TRANSMITTER
	DAY TANK LEVEL	LT-5	0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FEED PUMP							
	START/STOP**		0	1	0	0	2-#14	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	SH. PR.	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	PHOSPHATE							
	TANK WEIGHT		0	0	1	0	EXISTING	FROM SCALE
	FEED PUMP							
	START/STOP		0	1	0	0	EXISTING	TO CHEMICAL FEED PUMP
	SPEED COMMAND**		0	0	0	1	EXISTING	TO CHEMICAL FEED PUMP
	TUBE LEAK**		1	0	0	0	2-#14	FROM CHEMICAL FEED PUMP
	TREATMENT ROOM							
	FLOOD	LS-3	1	0	0	0	2-#14	FROM FLOAT SWITCH
	SMOKE ALARM		1	0	0	0	EXISTING	FROM SMOKE DETECTOR
	LOW ROOM TEMPERATURE		0	0	1	0	EXISTING	FROM THERMOSTAT
	FILTER CONTROL PANEL	CP-2						
	IN ALARM		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IN BACKWASH**		1	0	0	0	2-#14	FROM FILTER CONTROL PANEL

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SCC	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	INITIATE BACKWASH		0	1	0	0	EXISTING	TO FILTER CONTROL PANEL
	CANCEL BACKWASH		0	1	0	0	EXISTING	TO FILTER CONTROL PANEL
	HIGH FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	LOW FILTER LEVEL		1	0	0	0	EXISTING	FROM FILTER CONTROL PANEL
	IRON LEVEL		0	0	1	0	EXISTING	FROM LEVEL TRANSMITTER
	FLOW		0	0	1	0	EXISTING	FROM FLOW METER
	TOTALS		34	8	15	4		

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SECTION 26 14 15

LOW-VOLTAGE DISTRIBUTION SWITCHBOARDS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: CONTRACTOR shall provide, where shown on the Drawings, a free-standing, dead-front type, low-voltage distribution switchboard using group-mounted, circuit-protective devices as specified herein and as shown on the Drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. The low-voltage distribution switchboard and all components shall be designed, manufactured, and tested in accordance with the latest applicable standards of the following:
 - 1. NEMA PB-2.
 - 2. UL Standard 891.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of electrical equipment, cable, and wire products of the types and ratings necessary, whose products have been in satisfactory use in similar service for not less than 5 years. The manufacturer shall be ISO 9000, 9001, or 9002 certified.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.
- D. UL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures.
- E. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material, construction, and testing, where applicable.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. The following information shall be submitted:
 - 1. Master drawing index.
 - 2. Front view elevation.
 - 3. Floor plan.

4. Top view.
5. Single line.
6. Schematic diagram.
7. Nameplate schedule.
8. Component list.
9. Conduit entry/exit locations.
10. Assembly ratings including:
 - a. Short-circuit rating.
 - b. Voltage.
 - c. Continuous current.
11. Major component ratings including:
 - a. Voltage.
 - b. Continuous current.
 - c. Interrupting ratings.
 - d. Circuit breaker trip curves.
12. Cable terminal sizes.
13. Product data sheets.

1.05 REGULATORY REQUIREMENTS

- A. The low-voltage switchboard shall be UL labeled.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Section 01 60 00—Materials and Equipment.
- B. Equipment shall be handled and stored in accordance with manufacturer's instructions.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2—PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Low-voltage distribution switchboards shall be manufactured by Eaton Pow R Line Xpert, Square D QED, or equal, as approved by ENGINEER and in accordance with the substitutions under provisions of the General Conditions. All equipment specified in this section and provided by CONTRACTOR shall be by the same manufacturer.
- B. The Drawings and Specifications were prepared based on Eaton. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 RATINGS

- A. The switchboard assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current of 42,000 amps symmetrical at rated voltage as shown on the Drawings.
- B. Voltage ratings shall be as indicated on the Drawings.

2.03 CONSTRUCTION

- A. The switchboard shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides and rear shall be covered with removable, bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide adequate ventilation within the enclosure.
- B. All switchboard sections shall be front and rear-aligned with depth as required. All protective devices shall be group mounted. Devices shall be removable and load connections shall be accessible from the front of the enclosure to allow the back of the switchboard to be mounted against a wall.
- C. The switchboard assembly shall be provided with adequate lifting means.
- D. Provide a full height and depth metal barrier between adjacent vertical structures in the cable compartment.
- E. Provide a front-accessible, isolated, vertical wireway for routing factory and field wiring. Factory provisions shall be provided for securing field wiring without the need for adhesive wire anchors.
- F. Front access to all circuit breaker load connection points shall be provided for ease of troubleshooting and connection to external field connections without needing to remove the circuit breaker.

2.04 BUS

- A. All bus bars and bus joints shall be tin-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria of 65°C over a 40°C ambient outside of the enclosure. In addition to full UL air clearances, the bus shall be arranged to permit future additions.
- B. Provide a copper ground bus firmly secured to each vertical structure extending the entire length of the switchboard.
- C. All hardware used on conductors shall be high-tensile strength and zinc plated. All bus joints shall be provided with conical, spring-type washers.

2.05 WIRING/TERMINATIONS

- A. Provide small wiring, fuse blocks, and terminal blocks within the switchboard as needed. Control components mounted within the assembly shall be labeled corresponding to the

appropriate designations on the manufacturer's wiring diagrams. Labels shall be provided on the backpanel and not on the components themselves.

- B. Mechanical-type terminals shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75°C of the size as indicated on the Drawings.
- C. Lugs shall be provided in the incoming line section for connection of the main grounding electrode conductor. Additional lugs for connection of other grounding conductors shall be provided as shown on the Drawings.

2.06 MOLDED CASE CIRCUIT BREAKERS

- A. Provide molded-case circuit breakers with inverse time and instantaneous tripping characteristics as manufactured by Eaton Power Defense, or equal.
- B. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break, over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy, and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a manual means to exercise the trip mechanism.
- C. Circuit breakers shall have a minimum symmetrical interrupting capacity of 42,000 amps RMS at rated voltage, as shown on the Drawings.
- D. Trip units for circuit breakers below 45-amp frame shall be Eaton, fixed thermal-fixed magnetic type, unless otherwise noted.
- E. Trip units for circuit breakers with a 45-amp frame up to 400-amp frame shall be Eaton, fixed thermal-adjustable magnetic type with a mechanism for adjusting instantaneous pickup setting for automatic operation, unless otherwise noted. Range of adjustment shall be five to ten times trip rating.
- F. Trip units for circuit breakers indicated below to have a microprocessor-based RMS sensing tripping system shall consist of three current sensors, a trip unit, and flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide adjustable time-current protection functions. True RMS sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached. Microprocessor-based tripping systems shall include the following features:
 - 1. An adjustable trip setting dial mounted on the front of the trip unit shall establish continuous trip ratings of each circuit breaker.
 - 2. The microprocessor-based trip unit shall have both powered and unpowered thermal memory to provide protection against cumulative overheating in the event several overload conditions occur in quick succession.
 - 3. Trip units shall have built-in USB injection testing capability which provide test functionality through computer software and does not require additional testing equipment.

2.07 SURGE PROTECTION DEVICES

- A. Provide a surge protective device (SPD) as specified in Section 26 43 13–Surge Protective Devices on the load side of the main lugs in the switchboard. Provide a 30-amp, 3-pole circuit breaker for the SPD as shown on the Drawings.

2.08 ENCLOSURES

- A. NEMA 1 gasketed enclosure.

2.09 NAMEPLATES

- A. Provide engraved nameplates mounted on the front door of each vertical section in accordance with Section 26 05 53–Electrical Identification.

2.10 FINISH

- A. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. The color and finish of the switchboard shall be ANSI 61.

PART 3–EXECUTION

3.01 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest versions of ANSI and NEMA standards. The switchboard shall be completely assembled, wired, adjusted, and tested at the factory. After assembly, the complete switchboard shall be tested for operation under simulated service conditions to check the accuracy of the wiring and the functioning of all equipment. The main circuits shall be given a dielectric test of 2,200 volts for 1 minute between live parts and ground, and between opposite polarities. The wiring and control circuits shall be given a dielectric test of 1,500 volts for 1 minute between live parts and ground.
- B. The manufacturer shall provide three certified copies of factory test reports.

3.02 FIELD ADJUSTMENTS

- A. CONTRACTOR shall perform field adjustments of the protective devices as required to place the equipment in final operating condition.

3.03 FIELD START-UP AND COMMISSIONING

- A. Provide the services of a qualified and factory-trained manufacturer's representative to assist CONTRACTOR in the installation and start-up of the equipment specified in this section. The manufacturer's representative shall provide technical direction and assistance to CONTRACTOR in the general operation of the equipment, connections and adjustments, and testing of the assembly and components.

- B. The manufacturer's representative shall provide inspection of the final installation and perform site start-up and functional checkout of the equipment. Upon completion of the manufacturer's start-up and checkout, the manufacturer shall generate a site start-up and functional checkout report documenting all systems checked, as well as any incomplete work remaining and operational deficiencies.
- C. CONTRACTOR shall provide three copies of the manufacturer's site start-up and functional checkout report to ENGINEER for review.

END OF SECTION

SECTION 26 21 00

ELECTRICAL AND INTERNET SERVICE SYSTEM

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Utility Company.
 - 2. Secondary Service Characteristics.
 - 3. Definitions.
 - 4. Underground Electrical Service.
 - 5. Internet Service.
- B. Allowances: CONTRACTOR shall include in the Bid the cost of the following items specified in this Section. Refer to the individual sections listed below for a complete description of the Work required.
 - 1. Electric Utility Service Entrance, Paragraph 1.05—Underground Electrical Service.
 - 2. Internet Utility Service Entrance, Paragraph 1.06—Internet Service.
- C. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- D. See Division 01 for temporary service requirements. This section applies to permanent services only.

1.02 UTILITY COMPANY

- A. The Utility Company is Commonwealth Edison Company.

1.03 SECONDARY SERVICE CHARACTERISTICS

- A. The secondary service will be 277/480-volt, 4-wire, three-phase for the Eastern Pump Station.
- B. The secondary service will be 120/240-volt, 3-wire, single-phase for the Western Pump Station.

1.04 DEFINITIONS

- A. Service: As defined in the NEC, Article 100.
- B. Primary Voltage: Above 600 volts.
- C. Secondary Voltage: 600 volts and below.

1.05 UNDERGROUND ELECTRICAL SERVICE

- A. Provide complete underground electrical service except for items provided by the Utility Company.
- B. Provide electrical service system, except the Utility Company will provide:
 - 1. Primary cable from terminal pole to transformer (where applicable).
 - 2. Current transformers.
 - 3. Transformer.
 - 4. Metering at building.
- C. Coordinate the new electrical services with the Utility. An allowance of \$30,000 shall be included in the Lump Sum Bid for the work provided by the Utility and will be adjusted at final payment in accordance with actual Utility charges. All other costs for the electrical services shall be included in the Lump Sum Bid.

1.06 INTERNET SERVICE

- A. Coordinate Internet service with Comcast. Service shall be via fiber optic cable and be converted to copper in the demarcation box. Coordinate the installation of the service demarcation where shown on the Drawings. Coordinate the minimum service speeds with the Section 28 10 00–Access Control System system supplier. An allowance of \$4,000 shall be included in the Lump Sum Bid to be adjusted at final payment in accordance with actual Utility charges.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 INSTALLATION

- A. Trench and backfill for duct lines in accordance with Division 31–Earthwork.

3.02 UTILITY COORDINATION

- A. Division 26 Contractor shall obtain all required permits and licenses, pay all charges and fees, and give all notices necessary for utilities to perform the Work. Division 26 Contractor shall comply with all permit requirements whether the permit is issued to CONTRACTOR, the state, or the maintaining authority.
- B. Division 26 Contractor shall complete all required electrical service applications and forms based on the Drawings and Division 26 Contractor's means and methods for the work required.

END OF SECTION

SECTION 26 22 13

DRY-TYPE TRANSFORMERS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Dry-Type Transformers.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/NEMA ST 20—Dry-Type Transformers for General Applications.
- B. Transformers shall meet the requirements of the most current version of federal law 10 CFR Part 431 “Energy Efficiency Program for Certain Commercial and Industrial Equipment.”

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of electrical equipment, cable, and wire products of the types and ratings necessary, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.
- D. UL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures.
- E. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute and other standards pertaining to material, construction, and testing, where applicable.
- F. Transformer shall bear the UL Energy Efficiency Verification Mark to confirm that the unit meets the requirements of 10 CFR Part 431.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, loss data, efficiency at 25%, 50%, 75%, and 100% rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Section 01 60 00–Materials and Equipment.
- B. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.
- C. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet or snow, if handled in inclement weather.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D.
- B. Eaton.
- C. Substitutions: Under provisions of the General Conditions.

2.02 DRY-TYPE TRANSFORMERS

- A. Dry-Type Transformers: ANSI/NEMA ST 20; factory-assembled, air-cooled, dry-type, two-winding, ventilated transformers; ratings as shown on the Drawings. Transformers shall be DOE 2016 Efficiency rated.
- B. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635. Insulation system and average winding temperature rise for rated kVA shall be as follows:

kVA Rating	Class	Temperature Rise (°C)
1-500	220	115

- C. The maximum temperature of the top of the enclosure shall not exceed 50°C rise above a 40°C ambient.
- D. Winding Taps, Transformers 15 kVA and Larger: Two at +2 1/2% FCAN and four at -2 1/2% FCBN.
- E. Sound Levels: ANSI/NEMA ST 20.
- F. Basic Impulse Level: 10 kV for transformers less than 300 kVA.
- G. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- H. Mounting: Transformers shall be suitable for wall, floor, or trapeze mounting.
- I. Transformer core shall be constructed with high-grade, non-aging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade copper with continuous wound construction. Terminals shall be welded to the leads of the coils for better conductivity, less maintenance, and lower risk of hot spots. Terminals shall not be spot welded or bolted to the coil leads.
- J. Enclosure: ANSI/NEMA ST 20; NEMA Type 2 in indoor locations and Type 3R with weather shield in outdoor locations. Provide lifting eyes or brackets.
- K. Isolate core and coil from enclosure using vibration-absorbing mounts.
- L. Include engraved metal nameplate from manufacturer with transformer connection data. Also provide engraved phenolic nameplate as specified in Section 26 05 53–Electrical Identification.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install equipment per manufacturer's recommendations and as indicated on the Drawings. Coordinate final locations of equipment with CONTRACTOR, and review final locations with ENGINEER prior to setting equipment.
- B. Protect equipment during installation to prevent twisting or deformations, exposure to potentially damaging environments, and work of other trades. Maintain protection until completion of construction.
- C. Set transformer plumb and level.
- D. Use liquidtight flexible metal conduit, 3 feet maximum length, for connections to transformer case. Make conduit connections to side panel or bottom of enclosure only. Provide grounding as required by code.

- E. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
- F. All transformers with a 4-wire secondary shall be grounded as a separately derived system per the NEC.

3.02 ADJUSTMENTS AND CLEANING

- A. Immediately prior to final inspection, make final adjustments and thoroughly clean all equipment. Refinish all damaged enclosures to original quality.

3.03 FIELD QUALITY CONTROL

- A. Check for damage and tight connections prior to energizing transformer.
- B. Measure primary and secondary voltages and make appropriate adjustments.
- C. Visually inspect all equipment and components at time of delivery. Submit report to ENGINEER with list of items to be corrected.
- D. Electrically test and inspect all equipment. Submit final report to ENGINEER. Adjust or replace equipment to comply with manufacturer's specifications and resubmit corrected test report. Testing shall be done in accordance with NETA testing specifications for equipment supplied.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Lighting and Appliance Panelboards.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of electrical equipment, cable, and wire products of the types and ratings necessary, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical equipment installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.
- D. UL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures.
- E. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material, construction, and testing, where applicable.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All electrical equipment and material shall be received and stored with the factory tamperproof wrapping intact. Provide factory-wrapped waterproof flexible barrier material for factory packaging of equipment and material to protect against physical damage in transit. Do not install damaged equipment or material; remove from project site. Store equipment in factory coverings in a clean, dry, indoor space that provides protection against weather.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with

each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D.
- B. Eaton.
- C. Substitutions: Under provisions of the General Conditions.
- D. The drawings and specifications were prepared based on Eaton. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including but not limited to structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of drawings and/or specifications by ENGINEER.

2.02 PANELBOARDS

- A. Lighting and appliance panelboards shall be provided as indicated on the Drawings and as scheduled. Panelboards shall be factory-assembled and constructed in accordance with latest NEMA, UL, and NEC requirements and shall bear the UL label. Panelboard cabinets, including boxes and fronts, shall be code gauge galvanized steel. Front covers shall be hinged to allow access to wiring gutters without removal of panel trim (door-in-door type). All fronts shall be complete with cylinder-type lock and catch, and all cylinders shall be keyed alike. Provide two keys per panelboard to OWNER.
- B. Gutter and wiring space shall be provided according to NEMA and UL standards, except provide additional 6-inch-wide or -high wiring space for all double-lugged two or more section panels, feed-through panels; or panels that subfeed other panels at 100 amperes or more. CONTRACTOR shall instruct manufacturer as to where additional wiring space is needed, i.e., top, bottom, right, left, or combination. Where oversized cabinets are necessary for one section of a panelboard, all sections of the panelboard shall be the same size.
- C. Panelboards shall have full ampacity bussing throughout (full length of panel) and shall be full-size in regard to number of possible pole spaces. All lighting and appliance panels shall have poles as shown on the Drawings. Panelboards shall be identified with phases reading left to right and circuits alternately numbered left to right, odd numbers on the left, even numbers on the right.
- D. Panelboards shall have copper bussing. Provide copper ground bus in all panelboards.

- E. Lugs for incoming feeders shall be UL listed for use with copper conductors. Lugs shall be sized by CONTRACTOR in accordance with feeder sizes shown. Main lugs or main breakers shall be top- or bottom-mounted to coordinate with incoming feeder entrance location. Location shall be selected by CONTRACTOR.
- F. Branch circuit breakers shall be quick-make, quick-break, with thermal magnetic trip bolt-on type. Multipole breakers shall have common internal trip, UL listed as multipole units; handle ties are not permitted. All breakers shall be of the same manufacturer as the panelboard and provided at ampere capacity as scheduled.
- G. Main and feeder circuit breakers 225 amps and smaller shall be thermal magnetic trip type.
- H. Lighting and appliance and power distribution panelboards shall be provided as follows (types listed are Eaton):

Type	Maximum Voltage	Maximum Bus Amps	Maximum Brk. Amps	Minimum I.C.
Pow-R-Line 1X	240	600	100	10,000

- I. All panelboards scheduled with main circuit breakers shall be individually mounted main circuit breaker panels. Main circuit breakers installed in the location of branch circuit devices (branch-mounted mains) are not acceptable.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Panelboards shall be provided as indicated. Final locations, sizes, and mounting of panelboards shall be reviewed with ENGINEER prior to installation.
- B. Each panelboard shall have a typewritten circuit schedule provided on the inside cover. This schedule shall be covered with clear plastic in a metal frame and shall include room numbers, room name, and area or item served by each branch circuit. Room numbers used shall be those used by OWNER, except as otherwise requested by ENGINEER.
- C. Prior to final inspection, clean all panelboard interiors, adjust trims, covers, hinges and locks, and refinish covers to original condition.
- D. Panel trim shall have enamel finish as selected by OWNER.
- E. Balance load on all panelboards so phases are balanced to 15% of each other. Reconnect or redistribute circuits and/or circuit breakers to achieve balanced condition. Submit ammeter readings for all panelboard feeders indicating normal operating load and phase balance.

END OF SECTION

SECTION 26 24 19

MOTOR CONTROL

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Motor control devices, accessories, and general requirements.
 - 2. Variable frequency drives.
- B. Related Sections and Divisions:
 - 1. Applicable provisions of Division 01 shall govern work in this section.
 - 2. All other sections of Division 26.

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1.02 REFERENCES

- A. ANSI/NEMA ICS 6–Enclosures for Industrial Controls and Systems.
- B. NEMA ICS 2–Industrial Control Devices, Controllers, and Assemblies.

1.03 QUALITY ASSURANCE

- A. Manufacturers of Motor Control Equipment: Firms regularly engaged in the manufacture of motor control equipment of the types and capacities required whose products have been in satisfactory use in similar service for not less than 10 years.
- B. UL Labels: Provide motor control devices, variable frequency drives, etc., which have been listed and labeled by Underwriters Laboratories.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Provide product data on VFDs, relays, pilot devices, and switching and overcurrent protective devices.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01 33 00–Submittals.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.07 COORDINATION

- A. To provide proper coordination between Section 26 09 00–Controls and Instrumentation, and equipment specified herein, all equipment specified in this section shall be supplied as part of the Controls and Instrumentation package described in Section 26 09 00. This shall include, but not be limited to, equipment such as stand-alone VFDs and control stations. Drawings for motor control equipment shall be provided by the Section 26 09 00 System Supplier. Drawings from equipment manufacturers will not be accepted as shop drawings or O&M documents.

1.08 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.09 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Motor control devices and variable frequency drives shall be as manufactured by ABB, or equal, as approved by ENGINEER and in accordance with substitutions under provisions of the General Conditions. All equipment specified in this section and provided by CONTRACTOR shall be by the same manufacturer.
- B. The Drawings and Specifications were prepared based on ABB. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 MOTOR CONTROL DEVICES, ACCESSORIES, AND GENERAL REQUIREMENTS

- A. Auxiliary Contacts: NEMA ICS 2; two field convertible contacts minimum, in addition to seal-in contact, or as necessary.
- B. Push buttons: NEMA ICS 2; heavy-duty, oiltight (30 mm) as specified herein and shown on the Drawings. Pushbuttons in exposed, outdoor locations shall be rated NEMA 4X.
- C. Indicating Lights: NEMA ICS 2; heavy-duty, oiltight (30 mm), LED, push-to-test type as specified herein and shown on the Drawings. Indicating lights in exposed, outdoor locations shall be rated NEMA 4X.
- D. Selector Switches: NEMA ICS 2; heavy-duty, oiltight, (30 mm) as specified herein and shown on the Drawings. Selector switches in exposed, outdoor locations shall be rated NEMA 4X.
- E. Contactors: NEMA ICS 2. All contactors for starters specified herein shall be NEMA rated. IEC contactors are not allowed. Contactors shall be Allen-Bradley, Bulletin 509, or equal.
- F. Control Power Transformers: 240/120-volt secondary. Each motor controller shall have a dedicated control power transformer.
- G. Elapsed Time Meters: Redington/Engler 722 series, or equal, 3 inches round, flush door mounted, capable of reading up to 99,999.9 hours, nonreset type.
- H. Industrial control and power relays shall be installed in motor controller enclosures where required by System Supplier. Relays used to interface with PLC I/O, motor control circuits, hard-wired control logic, and for loads less than 8 amps shall be terminal style,

interposing/isolation relays. Relays for inductive loads, alarm lights, alarm horns, field wiring, or loads up to 15 amps shall be industrial, general purpose square base relays. Relays for lighting circuits or loads greater than 15 amps shall be industrial, electrically held power relays. Relays shall meet the following requirements:

1. Interposing/isolation relays:
 - a. Configuration: SPDT or DPDT as required by System Supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 VAC, or as required by System Supplier.
 - d. Contact Rating: 8A (DPDT), 16 A (SPDT).
 - e. Operating Life: 10 million cycles.
 - f. Status: On-Off flag-type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700 HK, or equal.
 2. General purpose relays:
 - a. Configuration: DPDT or 3 PDT as required by system supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 VAC.
 - d. Contact Rating: 15 A, minimum; 3/4 hp.
 - e. Operating Life: 10 million cycles.
 - f. Status: On-Off flag type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700-HB, or equal.
 3. Power relays.
 - a. Configuration: Electrically-held, 2-12 poles.
 - b. Mounting: DIN rail, square base.
 - c. Voltage: 120 VAC.
 - d. Contact Rating: 20 A continuous; 1 hp.
 - e. Operating Life: 10 million cycles.
 - f. UL listed.
 - g. NEMA rated.
 - h. Manufacturer: Allen-Bradley, 700-PK, or equal.
 4. All timing relays shall have On and timing Out LEDs. Timing relays shall be Allen-Bradley, 700-HN, or equal.
- I. Manufacturer of Accessories:
1. Terminal blocks shall meet the requirements of Section 26 05 19–Wire.
 2. Wire markers shall meet the requirements of Section 26 05 53–Electrical Identification.
- J. All motor control power shall be 120 volts with suitable protection (fuses or breakers). Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown.
- K. All motor controllers shall be equipped with the auxiliary devices to meet the requirements of the Drawings and Specifications. Each motor controller operating at other than 120-volt, single-phase shall be equipped with a control transformer providing 120-volt secondary for control power. Transformer shall have fused primary and secondary connections and shall be sized per manufacturer's recommendations. Coils and pilot lights in all motor controllers shall be 120 volts.
- L. Enclosures for Stand-Alone Controllers, Starters, and Control Devices:
1. Enclosures in indoor dry locations shall be NEMA 1 gasketed.
 2. Enclosures in indoor damp or wet locations or outdoor locations shall be NEMA 4X, stainless steel.

3. Starters and disconnect devices for motors shall be installed in common enclosures, combination type, with all accessories such as terminal blocks, push-to-test pilot lights, and H-O-A switches.
4. All wiring within motor controller enclosures shall be landed on terminal blocks. This shall include internal control wiring, field wiring, and any spare or unused wiring.
5. Control stations shall include devices as shown on the Drawings and specified in Section 26 09 00–Controls and Instrumentation.

2.03 VARIABLE FREQUENCY DRIVES

- A. VFDs shall be provided to match the load type (constant or variable torque) of the specified application, as well as the full load amps of the motor furnished for the project.
- B. System Operating Conditions:
 1. 480 VAC $\pm 10\%$.
 2. Three-phase, 3-wire, any phase sequence.
 3. 60 Hz $\pm 2\%$.
 4. Storage temperature -25°C to +55°C.
 5. Operating temperature 0 to 40°C.
 6. Altitude: 3,300 feet above sea level maximum.
 7. Humidity: 95% noncondensing maximum.
- C. Variable Frequency Unit:
 1. Conform to NEMA and NEC standards.
 2. CSA and ETL approved and/or UL approved.
 3. Overall VFD efficiency shall be a minimum of 96.5%, $\pm 1\%$, at 100% speed and motor load at nominal line voltage. Efficiency rating shall include control power supplies, control circuits, and all cooling fans.
 4. Input:
 - a. Withstand without component failure line voltage transients up to 3,000 volts per ANSI C37.
 - b. Design shall include DC bus chokes (two) used in conjunction with one or more capacitors. The DC bus chokes shall be incorporated in the design to minimize line-side harmonics. Magnetic-only designs shall include line filters to limit harmonics to a value no greater than in a system using dual DC bus chokes.
 - c. Include MOV line-side protection.
 - d. Inverter input for six pulse VFDs shall have a true power factor of 0.95 or better at rated load and nominal line voltage throughout the entire speed range.
 - e. Units shall be capable of operating attached to the same power bus without affecting each other's operations. If operational problems occur, an isolation transformer shall be added to each drive at no additional Contract cost.
 - f. Five percent line reactors.
 - g. Drives larger than 40 hp shall include fuses on the drive input. Fuses shall be provided with indicating-type fuse blocks as manufactured by Bussman Model JM60, including see-through covers with integral open fuse indicating lights for each fuse. Fuses 60A and greater are allowed to have integral blown fuse indication and be provided with nonindicating type fuse blocks.
 5. Inverter Output:
 - a. Inverter shall utilize latest generation IGBTs, be microprocessor based, and isolated from power circuits.
 - b. Match motor specified.
 - c. Three-phase, 3-wire.

- d. Pulse width modulated wave form with selectable Sensorless Vector, Flux Vector, Volts/Hertz, and adjustable voltage control modes.
- e. Maximum output 460 volts.
- f. Frequency 2 to 650 Hz.
- g. Frequency accuracy $\pm 1\%$ of setting at any point in the specified speed range in a 24-hour period.
- h. Full load output current shall be rated in excess of the AC motor selected.
- i. Motor performance:
 - (1) 3% regulation in the manual speed control mode.
 - (2) Normal duty overload rating: 110% continuous current for 1 minute; 150% for 3 seconds.
 - (3) Heavy-duty overload rating: 150% continuous current for 1 minute; 180% for 3 seconds.
 - (4) 110% starting torque minimum.
- 6. AC drive features:
 - a. Embedded I/O for discrete and analog signals. Analog signals shall include 4-20 mA circuitry mounted on separate printed circuit board to include offset, slope, minimum clamp, and separate acceleration and deceleration adjustments from 0 to 3600 seconds. An internal manual speed potentiometer is to be provided for simulating the 4-20 mA input for start-up and maintenance. The circuit is to be designed to accept either a positive or negative signal, grounded or ungrounded.
 - b. Slot-based architecture for expansion control and communication cards.
 - c. Real-time clock with battery for date/time stamping of events.
 - d. Integral thermostat control of door-mounted cooling fans.
 - e. Current limit circuitry: 20% to 160% of drive-rated amps.
 - f. Additional features for constant torque units shall include:
 - (1) IR compensation to provide automatic voltage boost or reduction to optimize both starting torque and system input kW.
 - (2) Slip compensation to provide 0.5% regulation with a 100% load change.
 - (3) Inner current loop regulator.
- 7. Enclosures:
 - a. The VFD system shall be furnished with NEMA-rated (as previously specified) wall-mounting VFD enclosure. VFD structures shall be sized as needed to accept the unit specified.
 - b. Items to be mounted in the VFD structure or structures:
 - (1) Inverter.
 - (2) Incoming door interlocked, thermal-magnetic, molded-case circuit breaker.
- 8. Interlocks:
 - a. Fault contact to terminals.
 - b. VFD run contact to terminals.
- 9. VFD protection:
 - a. Adjustable current limit of 20 to 160% minimum.
 - b. Instantaneous overcurrent trip.
 - c. Electronic ground fault and short-circuit protection to shut down the drive without fuse or component failure. Electronic ground- and short-circuit protection to be functional with an input line of 480 VAC $\pm 10\%$. The drive manufacturer is to be prepared to demonstrate ground fault and short-circuit protection without the use of an isolation transformer at drive start-up.
 - d. Input thermal-magnetic ambient compensated circuit breaker with a through-the-door interlocked operator.
 - e. Shut down on loss of any input phase for longer than 3 cycles.
 - f. Output phase sequence to be independent of input phase sequence.

- g. High- or low-sustained voltage.
- h. 120 VAC grounded control circuits.
- i. Electrically and/or optically isolated low voltage logic.
- j. Corrosion protection:
 - (1) Gold-plated plugs (male and female section) on all printed circuit boards.
 - (2) Protective board coating (conformal coating).
- k. MOV converter protection.
- l. DC bus chokes to minimize line side current harmonics.
- m. Additional features for constant torque units:
 - (1) I²T protection to provide 150% current for one minute.
 - (2) Regenerative override protection.
- 10. VFD adjustments:
 - a. Maximum speed: 50 to 100%.
 - b. Minimum speed: 0 to 70%.
 - c. Current limit: 20 to 110%, 160% on constant torque units.
 - d. Linear acceleration 0 to 3,600 seconds.
 - e. Linear deceleration 0 to 3,600 seconds.
 - f. Output volts/Hz trim.
 - g. Voltage boosts.
 - h. Additional features for constant torque units:
 - (1) Slip compensation.
 - (2) IR compensation.
 - i. All drives shall attempt to restart three times prior to indicating failure.
- 11. Inverter digital or LED diagnostic features:
 - a. Current limit signal.
 - b. Regenerative override signal.
 - c. External fault (e.g., motor overload).
 - d. Low line voltage.
 - e. High line voltage.
 - f. Current overload.
 - g. High DC bus voltage.
 - h. Current trip.
 - i. Short-circuit.
- 12. Inverter construction:
 - a. Modular construction for ease of maintenance.
- 13. Mount modules on enclosure subpanel:
 - a. Easily accessible from front.
 - b. Interconnect with plugs.
 - c. Construct boards of fire-retardant materials in accordance with NEMA grade FR4 specifications.
- D. Inverter Quality Control:
 - 1. Test all power devices at rated temperature and current for dv/dt, tq, TRR, and leakage.
 - 2. Test integrated circuits for programmed parameters at rated temperature.
 - 3. Treat printed circuit boards for corrosion resistance (conformal coating).
 - 4. Provide gold-plated connections at all points where plugs are used.
 - 5. Thermal cycle all printed circuit boards for 10 cycles between 0°C to 65°C prior to installation in inverter.
 - 6. All units to be tested at a rated load and temperature after assembly.

- E. The 6-pulse variable speed drives shall be ABB ACQ 580, no equal, to match OWNER's existing equipment. All drives shall be by the same manufacturer.
- F. Minimum, maximum, and harmonic skip speed setpoints shall be programmed into each VFD. CONTRACTOR shall coordinate these setpoints with the manufacturer of the equipment served. CONTRACTOR shall provide a table listing the minimum, maximum, and skip setpoints programmed into each VFD on the project to ENGINEER and OWNER.
- G. Provide expansion I/O cards, quantity as required, so that signals noted in the I/O list are transmitted/received to/from the plant SCADA System via the EtherNet/IP network.
- H. Provide manufacturer certified start-up and warranty service for each VFD. Service shall be for 2 years and include all travel and expenses. Warranty service shall commence at the date of substantial completion.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Provide motor control equipment in accordance with manufacturer's instructions and Drawings.
- B. Overloads shall be selected on the basis of nameplate horsepower and service factor. Selection of overloads based on horsepower shown on the Drawings is not acceptable.
- C. All motor control wiring shall be installed in accordance with control wiring diagrams furnished.
- D. Wireways in VFD enclosures shall be used only for routing of conductors. Splices are not allowed within wireways.
- E. All wiring within VFD enclosures shall be landed on terminals inside buckets or equipment compartments and not left unterminated within wireways. This shall include all internal VFD enclosure wiring and external field wiring, including spare wires.
- F. Motor Data: Provide neatly typed label inside each motor controller enclosure identifying motor served, nameplate horsepower, full-load amperes, code letter, service factor, and voltage/phase rating.
- G. Control wiring and field wiring (120 V and below) within VFD enclosures shall be separated from power wiring (277 V and above). Where possible, route control and field wiring in separate raceways or wireways. Provide a minimum of 2 inches separation between control wiring, field wiring, and power wiring.
- H. All motors will be provided by other divisions, ready for connections. CONTRACTOR shall be responsible for electrical connections for power and control circuit wiring, proper phase relationships, and correct motor rotation.
- I. Provide motor circuit wiring for each motor from the source of supply to the terminal box on the motor including all intermediate connections at devices such as VFDs, disconnect switches, etc.

- J. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits, as specified in Section 26 05 19–Wire.
- K. Provide motor controllers as specified for all motors, unless shown or specified that motor controllers or control equipment will be furnished by others.
- L. Provide motor circuit disconnect devices for all motors, unless shown or specified that disconnect devices or starters are furnished with other equipment.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Wall Switches.
 - 2. Receptacles.
 - 3. Cover Plates.
 - 4. Outdoor Photo Cells.
 - 5. Thermostats.
 - 6. Wall-Mounted Occupancy Sensors.
 - 7. Ceiling-Mounted Occupancy Sensors.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. NEMA WD 1—General-Color Requirements for Wiring Devices.
- B. NEMA WD 5—Specific-Purpose Wiring Devices.
- C. Drawings—Bill of Materials.

1.03 QUALITY ASSURANCE

- A. Manufacturers of switches, outlets, boxes, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical material, etc., which have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.

- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 WALL SWITCHES

- A. A-C general use Industrial specification grade, snap switch, 20 amperes, 277 volts, one of the following: Eaton 122*, Leviton 122*, or Pass and Seymour PS20AC*.
- B. Provide white-colored handles.
- C. Manual motor switches or manual motor controllers for 120 V or 240 V motors on circuits 20 amps or less shall be specification grade snap switch as specified above.

*Complete catalog number for pole arrangement necessary.

2.02 RECEPTACLES

- A. Twenty ampere, 125-volt, NEMA 5-20R, Industrial specification grade, straight blade, 3-wire duplex grounded outlets, one of the following: Eaton 5362, Leviton 5362, Pass and Seymour 5362. Provide white color.
- B. Weather-Resistant Receptacle: Weather-resistant receptacles shall include GFCI protection and be UL 498 listed, 20 ampere, 125-volt, NEMA 5-20R, heavy-duty, commercial grade, with WR marking on the face, Eaton WRS GF20, or equal. Provide white color.
- C. GFCI Receptacle: GFCI receptacles shall be UL 943 listed, Pass and Seymour 2097, Eaton TRSGF20 receptacle with integral ground fault current interrupter. Provide white color.

2.03 COVER PLATES

- A. Indoor outlet and switch boxes that are surface mounted or recessed in non-hazardous, unfinished spaces shall be provided with standard 302 series stainless steel cover plates. Provide blank 302 stainless steel cover plates for unused outlet and switch boxes and where noted on the Drawings.
- B. NEMA 4X and weatherproof switch covers shall be Thomas and Betts, Industrial Gray, toggle switch cover, Model E98TSCN-CAR, Eaton S2983 or equal.
- C. While in use receptacle covers for exterior use shall be Leviton IUM1V-GY, or equal. Receptacle covers for NEMA 4X locations shall be Leviton 5980, Eaton WIU-1VX, or equal.
- D. Cover plates for manual motor switches, manual motor controllers, and NEC required equipment disconnects shall have provisions for locking the switch in the On or Off position.

2.04 OUTDOOR PHOTOCELLS

- A. Photocell type shall be silicone diode and shall have electronic photocontrols. Photocell shall accept an input voltage range from 120 volts AC to 277 volts AC, be rated for a 1000 watts tungsten range, and be rated for 1,650 watts at 277 volts AC for LED installations. Photocell controller shall be gasketed for outdoor installation.
- B. Photocell shall instantly turn on when activated and shall have an adjustable sensor-off time delay (2 to 5 seconds) to prevent false off switching. On activation shall occur at 1.5 foot-candles and off activation shall occur at 4.5 foot-candles. In the event the photo controller fails, the photo controller shall fail on.
- C. Operational temperature range shall be -40°F to 158°F. Photocell shall be UL listed and include an 8-year warranty.
- D. Photocells for new construction shall be model EK4336S, as manufactured by Intermatic, or equal. Photocell mounting shall be suitable for installation in an approved in-wall, outdoor outlet box with weatherproof wall plate model K43-WP-KIT, as manufactured by Intermatic, or equal. Provide a light shield accessory model 6LV1352, as manufactured by Intermatic, or equal.

2.05 THERMOSTATS

- A. Line voltage thermostats for single-stage heating shall be PECO Model TF115-001, or equal. Thermostats shall be rated NEMA 4X with a 40°F to 110°F temperature range and fixed 3°F deadband.
- B. Thermostats shown on the Drawings shall be single-stage unless otherwise noted.

2.06 WALL-MOUNTED OCCUPANCY SENSORS (DOUBLE POLE [TYPE 2])

- A. The sensor shall use both passive infrared and ultrasonic detection methods for detecting room occupancy. The unit shall fit on/in a standard single-gang switchbox and shall require two wires and a grounded box for proper operation.

- B. The sensor shall utilize a temperature compensated, dual element sensor and a multielement Fresnel lens. The lens shall be Poly IR4 material to filter short wavelength IR, such as those emitted by the sun and other visible light sources.
- C. Sensor shall have selectable DIP switches to adjust automatic time delay to fit occupant usage patterns.
- D. The sensor shall operate at universal voltages of 100 to 300 VAC. Sensor shall be capable of switching line voltage loads without the use of relay power packs.
- E. Double pole sensors shall have the capability of switching two independent line voltage circuits. Each pole shall have no minimum load requirement and shall be capable of switching from 0 to 800 watts incandescent, 0 to 800 watts fluorescent or 1/6 hp at 120 VAC, 60 Hz.
- F. Sensor shall not protrude more than 3/8 inch from the wall.
- G. Sensor shall have a 28-segment, two-level, Fresnel injection molded lens.
- H. Sensor shall cover up to 1,000 square feet for walking motion, with a field view of 180 degrees.
- I. In automatic mode, sensor shall be able to automatically return to Automatic-on after lights are turned off manually.
- J. Sensor shall have a LED indicator that remains active at all times in order to verify detection within the area to be controlled.
- K. Sensor shall have a service switch to allow end-users to operate the sensor in the event of a failure, set by a DIP switch.
- L. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.
- M. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap.
- N. The PIR wall switch sensor shall be a completely self-contained control system that replaces a standard toggle switch.
- O. Double-pole wall-mounted passive infrared occupancy sensor shall be Model DSW-302 as manufactured by Wattstopper, Eaton OSD10DH, or equal.

2.07 CEILING-MOUNTED OCCUPANCY SENSORS (TYPE 3)

- A. The sensor shall use both passive infrared and ultrasonic detection methods for detecting room occupancy. The unit shall fit on/in a standard octagon box and shall require two wires and a grounded box for proper operation.
- B. Sensors shall have selectable DIP switches to adjust sensitivity settings to fit occupants usage patterns.

- C. Sensors shall be mounted to the ceiling with a flat, unobtrusive appearance and provide 360 degrees of coverage.
- D. Sensor shall utilize a temperature compensated dual element sensor and a multielement Fresnel lens. Fresnel lens shall be a Poly IR 4-based material to filter short wavelength infrared, such as those emitted by the sun and other visible light sources.
- E. The sensors shall feature terminal-style wiring.
- F. The sensor shall have a 34-element Extended Range lens.
- G. Sensor shall cover 360 degrees, up to 2,000 square feet of walking motion with the Standard Lens mounted at 8 feet AFF.
- H. Sensors shall operate at 24 VDC/VAC and half-wave rectified and utilize a power pack.
- I. Power pack shall be a self-contained transformer and relay module and shall meet the following requirements:
 - 1. Power and auxiliary relay packs shall have 1/2-inch snap-in nipple for 1/2-inch knockouts. Power and auxiliary relay packs shall be mounted inside of junction boxes above suspended ceilings. If the occupancy sensor is installed in an unfinished exposed location, sensor shall be installed within a junction box. The junction box cover shall be permanently labeled "OS Control."
 - 2. Power and auxiliary relay packs shall have dry contacts capable of switching 20 amp ballast load, 13 amp incandescent, 1 hp at 120 VAC, 60 Hz.
 - 3. Power packs shall provide a 24 VDC, 150 mA output.
 - 4. Power packs shall be capable of parallel wiring without regard to AC phases on the primary.
 - 5. Auxiliary relay packs shall be identical in physical size to power packs and contain no transformer power supply and shall switch 120 VAC.
 - 6. Power pack and auxiliary relay packs shall be UL 2043 listed, use UL 94 V-O plenum rated plastic, and have low voltage Teflon-coated leads, rated for 300 volts.
 - 7. Power and auxiliary relay packs shall be UL and CUL listed.
 - 8. Power and auxiliary relay pack shall be Model OPP20 as manufactured by Leviton, Eaton AHSP20-MV, or equal.
- J. The sensor shall have an additional single-pole, double-throw isolated relay with normally open, normally closed, and common outputs.
- K. Sensors shall have a time delay that is adjusted automatically or shall have a fixed time delay of 5 to 30 minutes set by DIP switches.
- L. The sensor shall have a LED indicator that remains active at all times in order to verify detection within the area to be controlled. The LED shall be able to be disabled for applications that require less visibility.
- M. Ceiling-mounted motion sensor shall be Model OSC20-M0 as manufactured by Leviton, Eaton AHAC-DT-2000, or equal.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Weather-resistant receptacles shall be provided in all damp and wet locations.
- B. GFCI receptacles shall not be series wired.
- C. Install wall switches 48 inches above floor (top of box), "Off" position down, unless otherwise noted.
- D. Install receptacles vertically with the grounding pole on the top and at the heights shown on the Drawings, unless otherwise noted. Heights listed on the Drawings are to the bottom of the box.
- E. Install thermostats 48 inches above floor (top of box).
- F. Install devices and cover plates flush and level.
- G. Back wiring is not allowed for switches and receptacles. Wires shall be terminated with the device screw terminal.
- H. Individual labels shall be placed on the back of all switch faceplates and receptacle faceplates indicating the lighting panel and circuit from which the switch or receptacle is fed. Labels shall be white background with black lettering no smaller than 12-point font. Provide permanently attached self-adhesive type, machine fed, and self-laminating labels, or equal. All labels must be by the same manufacturer, same size, and same font. Handwritten labels are not acceptable.
- I. Individually adjust each occupancy sensor's sensitivity and install sensor shields as required such that the sensor properly serves movement in all areas of the room, but does not energize lighting due to movement in adjacent rooms or due to ambient noise in the space when unoccupied (e.g., noise from pumps, HVAC equipment, servers, etc.). Adjust off-delay timers as required so that sensors operate in a manner that is acceptable to OWNER.

END OF SECTION

SECTION 26 28 00

OVERCURRENT PROTECTIVE DEVICES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Provide overcurrent protective devices as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop Drawings and product data in accordance with provisions of Section 01 33 00—Submittals, including electrical ratings, physical size, interrupt ratings, trip curves, I²t curves, and manufacturer's detailed specifications.

1.03 QUALITY ASSURANCE

- A. Comply with the following requirements:
 - 1. NFPA 70 National Electrical Code (NEC).
 - 2. Local codes and ordinances.
 - 3. Provide overcurrent protective devices by same manufacturer for each type of device.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00—Materials and Equipment.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 CIRCUIT BREAKERS

- A. General:
 - 1. Comply with UL 489 requirements.
 - 2. Provide thermal and magnetic protection unless noted otherwise.
- B. Main and Generator Breakers:
 - 1. Circuit breakers shall have a short-circuit interrupting rating as indicated on the Drawings.
 - 2. Provide solid-state circuit breakers with electronic sensing, timing and tripping circuits with adjustable settings. Provide adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, and instantaneous pickup settings.
 - 3. Ground Fault Protection: Adjustable ground fault pickup and delay shall be provided for circuit breakers with frame sizes 1,000 amperes and larger.
- C. Feeder Breakers:
 - 1. Circuit breakers shall have a short-circuit interrupting rating as indicated on the Drawings.
 - 2. Solid-State Circuit Breakers: Circuit breakers that feed lighting panel transformers shall be provided with electronic sensing, timing, and tripping circuits with adjustable settings. Provide adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, and instantaneous pickup settings.
 - 3. Field-Adjustable Thermal-Magnetic Trip Circuit Breaker: NEMA AB1. Provide circuit breakers with frame sizes less than 400 amperes with adjustable instantaneous pickup setting for automatic operation. Range of adjustment shall be three to ten times the trip rating.
- D. All lugs shall be rated to accept copper conductors.

2.02 ENCLOSURES

- A. Circuit breakers shall be installed within switchboard, panelboard, etc. as shown on the Drawings.
- B. Provide circuit breaker with NEMA 4X, stainless steel enclosure in outdoor locations unless noted otherwise on the Drawings.

2.03 ACCESSORIES

- A. Provide the following accessories. Handle Lock: Include provisions for padlocking.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Install overcurrent protective devices in accordance with manufacturer's recommendations.

3.02 ADJUSTMENT

- A. Set and record adjustable settings on circuit breakers to provide selective coordination and proper operation.

END OF SECTION

SECTION 26 28 16
DISCONNECT SWITCHES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Disconnect Switches.
 - 2. Fractional Hp Motor Switches.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. NEMA KS 1–Enclosed Switches.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Include outline drawings with dimensions and equipment ratings for voltage, capacity, horsepower, and short-circuit.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Disconnect Switches: Square D Class 3110 or Eaton Type DH.

- B. Manual Motor Switches: Square D Class 2510 Type K or Eaton B330.
- C. Substitutions: Under provisions of the General Conditions.

2.02 DISCONNECT SWITCHES

- A. Nonfusible Disconnect Switches: NEMA KS 1; heavy-duty, quick-make, quick-break, load interrupter enclosed knife switch with externally-operable handle interlocked to prevent opening front cover with switch in "On" position. A defeater shall be provided to bypass this interlock. Handle lockable in "Off" position. Provide auxiliary contacts to remove control power associated with field devices or instruments interlocked with equipment served. Auxiliary contacts shall be by the disconnect manufacturer.
- B. Manual Motor Switches: Where noted on the Drawings, manual motor switches shall be provided for three-phase motors with circuit rating of 30 amps or less. Manual motor switches shall have toggle operator without overload protection or indicator light. Provide cover plate for all switches to meet the finish or classification of the space. Cover plate shall have provisions for locking the switch in the "On" or "Off" position.

2.03 SINGLE-PHASE MOTOR SWITCHES (2 HP OR LESS)

- A. Where noted on the Drawings, motors rated 2 hp or less, for operation on 120 V or 240 V, single-phase, shall be provided with a specification-grade wall switch as disconnecting means. See Section 26 27 26—Wiring Devices for additional information.

2.04 ENCLOSURES

- A. Provide disconnect switch enclosures in outdoor or wet locations:
 - 1. Indoor dry locations: NEMA 12, steel.
 - 2. Outdoor, corrosive, or wet locations: NEMA 4X, stainless steel.
- B. Provide manual motor switch enclosures in indoor dry, outdoor, or wet locations: NEMA 4, die cast zinc, unless noted otherwise on the Drawings.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Provide disconnect switches where indicated on the Drawings. Maximum mounting height shall be 42 inches above finished floor unless noted otherwise, or acceptable to ENGINEER based on field conditions.
- B. Provide wall switch for each single-phase fractional horsepower motor where indicated on the Drawings.
- C. Disconnect enclosures that house wiring powered from a source separate from the motor power wiring shall have a nameplate installed on the front of the disconnect indicating that power may be present at the motor when the disconnect is in the "Off" position.
- D. Wiring within disconnects shall only be for loads or equipment served by that disconnect. Foreign wiring within disconnect enclosures is not allowed. All wiring within disconnect

enclosures shall be landed on lugs or terminals provided by the disconnect manufacturer, or on dedicated terminal strips for instrumentation equipment or field devices. Splices and spring wire connectors are not allowed within disconnect enclosures.

END OF SECTION

SECTION 26 32 13.1

EAST RECEIVING STATION STANDBY POWER SYSTEM

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Steel Base Assembly, Natural Gas Engine, Generator, Engine-Generator Set Controls, Environmental Systems.
- B. Related Sections and Divisions:
 - 1. Applicable provisions of Division 01 shall govern work in this section.
 - 2. The following listing of related sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. Other sections of the specifications not referenced below shall also apply to the extent required for proper performance of this work. All other sections of Division 26.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop drawings shall include the following:
 - 1. Detailed descriptions of equipment to be furnished, including all deviations from these specifications.
 - 2. Detailed layouts of all equipment and ancillary items.
 - 3. The manufacturer shall furnish schematic and wiring diagrams for the generator and an interconnection wiring diagram for the entire standby system. Test reports certified by the manufacturer shall be provided to ENGINEER for the entire system.

1.03 QUALITY ASSURANCE

- A. The generator shall be listed by Underwriters Laboratories, Inc., UL2200.

1.04 OPERATING CONDITIONS

- A. Engine-generator set shall be capable of continuous standby rating at 1,800 rpm, 0.8 PF, three-phase, 3-wire, 480 volts, at 60 hertz, and shall have a minimum capability of 300 kW, 375 kVA prime and 350 kW, 438 kVA standby.
- B. The generator set manufacturer shall verify the engine is capable of driving the generator with all accessories in place and operating, at the generator set kW rating after derating for the range of temperature expected in service, and the altitude of the installation. Site conditions are 100°F maximum ambient and 650 feet altitude.
- C. Voltage regulation shall be $\pm 0.5\%$ of rated voltage for any constant load between no load and rated load.

- D. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed $\pm 0.5\%$.
- E. Random Voltage Variation: The cyclic variations in RMS voltage shall not exceed $\pm 0.5\%$ of rated voltage for constant loads from no load to rated load, with constant ambient and operating temperature.
- F. Total Harmonic Distortion: The sum of AC voltage wave-form harmonics shall meet NEMA MG1 and shall not exceed 5% of rated voltage (L-N, L-L, L-L-L), and no single harmonic shall exceed 3% of rated voltage.
- G. Telephone Influence Factor shall be less than 50 per NEMA MG1-22.43.
- H. The engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- I. Motor starting capability shall be a minimum of 1750 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 25%.

1.05 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The AC engine-generator set shall be as manufactured by Rehlko Power System REZX Series or Cummins Power Generation.
- B. The Drawings and Specifications were prepared based on Rehlko Power Systems with a maximum single-step voltage dip less than 15%. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 STEEL BASE ASSEMBLY

- A. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2.03 ENGINE

- A. The engine shall be stationary, liquid-cooled, for use with natural gas. The design shall be 4-cycle, 10-cylinder, minimum displacement of 1,115 cubic inches, turbo charged, air cooled, as required by engine manufacturer. Engine shall be certified as capable of driving the generator of the rating indicated above on a continuous standby basis for the duration of normal source interruptions.
- B. Engine accessories shall include the following:
 - 1. A 24-volt DC electric starter as required by the engine manufacturer.
 - 2. Replaceable dry element air cleaner with restriction indicator.
 - 3. Positive displacement, mechanical, full-pressure lubrication oil pump, full-flow lubrication oil filters with replaceable elements, pressure relief valve, dipstick oil level indicator, and oil drain valve with hose extension. Provide all lubricants for proper operation of the unit.
 - 4. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, and accelerating to rated speed.
 - 5. Engine protective devices to indicate alarm and engine shutdown for the following:
 - a. Low coolant temperature alarm.
 - b. Low coolant level alarm and shutdown.
 - c. Low lubrication oil pressure alarm and shutdown.
 - d. High coolant temperature alarm and shutdown.
 - e. Over-speed shutdown.
 - f. Over-crank shutdown.
 - 6. Battery charging alternator, 45 amp minimum, with solid-state voltage regulator.
 - 7. Engine shall be radiator-cooled by engine-mounted radiator system including belt-driven pusher fan, coolant pump, and thermostat temperature control. Rotating parts shall be

guarded against accidental contact. The cooling system shall be rated for full-rated load operation in a 104°F ambient condition. Provide radiator drain extension to the side of the generator. Extension shall include shutoff valve.

8. The equipment supplier shall provide 50% ethylene glycol antifreeze solution to fill engine cooling system.
9. Engine-mounted thermostatically controlled coolant heater to aid in quick starting. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 104°F in a 40°F ambient, in compliance with NFPA 110 requirements. Heater shall be rated single-phase, 480 volts, 6,000 watts and be disconnected whenever the engine starts. Heater shall be UL 499 listed and labeled. The coolant heater(s) shall include provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. CONTRACTOR shall provide proper circuit from normal utility power source.
10. Vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer.
11. Provide a 60-watt, 120 VAC oil heater and a 10-watt, 120 VAC breather tube heater for generators located outdoors.
12. Flexible fuel lines, fuel strainer, and fuel solenoid. CONTRACTOR shall install fuel lines and fuel solenoid in accordance with manufacturer's recommendations.

2.04 ENGINE EXHAUST SYSTEM

- A. For natural gas generators larger than 150 kW standby, engine emissions shall meet current EPA NSPS Compliant capable Gas engine emission regulations. Engines shall be emission-tested and documented EPA Compliant Capable, and all costs associated with any on-site EPA-required emissions testing shall be included in the Bid. Provide EPA-approval documentation to OWNER prior to final completion.
- B. Exhaust muffler shall be provided for the engine of size as recommended by manufacturer. Muffler shall be of the critical grade-type. Exhaust inlet location shall be selected by manufacturer.
- C. Stainless steel flexible exhaust connections shall be provided as required for connection between engine exhaust manifold and exhaust line in compliance with applicable codes and regulations.
- D. Provide an exhaust condensation trap with manual drain valve to trap and drain off exhaust condensation to prevent condensation from entering the engine.
- E. Provide a suitable rain cap at the stack outlet. Provide all necessary flanges and special fittings for proper installation.

2.05 BATTERY CHARGER

- A. A UL-listed/CSA-certified 10-ampere voltage regulated battery charger shall be provided for the engine-generator set.
- B. Charger shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
- C. The charger shall be compliant with UL 991 requirements for vibration resistance.

- D. The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL labeled with the maximum battery amp-hour rating that can be recharged within 24 hours. The label shall indicate that the charger is suitable for charging of 200 AH batteries in accordance with NFPA requirements.
- E. The charger shall incorporate a 4-rate charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100% of charge, and a float stage to maintain a fully charged battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer. Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.
- F. The DC output voltage regulation shall be within $\pm 1\%$. The DC output ripple current shall not exceed 1 amp at rated output current level.
- G. The charger shall include the following features:
 - 1. Two-line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming.
 - 2. LED indicating lamps to indicate normal charging (green), equalize charge state (amber), and fault condition (red).
 - 3. AC input overcurrent, over voltage, and under voltage protection.
 - 4. DC output overcurrent protection.
 - 5. Alarm output relay.
 - 6. Corrosive-resistant aluminum enclosure.

2.06 STARTING AND CONTROL BATTERIES

- A. A calcium/lead antimony storage battery set of the heavy-duty starting-type shall be provided. Battery voltage shall be compatible with starting system. The battery set shall be rated no less than 925 CCA and shall be capable of a minimum of three 15-second cranking cycles. A battery rack constructed in conformance with NEC requirements and necessary cables and clamps shall be provided.

2.07 GENERATOR

- A. The generator shall be a single prelubricated bearing, self-aligning, 4-pole, two-thirds pitch, brushless, synchronous-type, revolving field with amortisseur windings, and with direct driven centrifugal blower fan for proper cooling and minimum noise. No brushes will be allowed. Generator shall be directly connected to engine fly wheel housing and driven through a flexible coupling to provide permanent alignment. Generator design shall prevent potentially damaging shaft currents.
- B. Insulation shall meet NEMA standards for Class H and shall be UL 1446 listed. The maximum temperature rise shall not exceed 130°C at 40°C ambient.
- C. The generator shall be three-phase, broad-range, reconnectable and shall have 12 leads brought out to allow connection by user to obtain any of the available voltages for the unit.

- D. The generator set shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5% above or below rated voltage.
- E. Generators shall utilize a permanent magnet generator (PMG) to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single-phase or three-phase fault at approximately 300% of rated current for not more than 10 seconds.
- F. The subtransient reactance of the alternator shall not exceed 15%, based on the standby rating of the generator set.
- G. Provide a 700-amp mainline circuit breaker with the engine-generator set. Circuit breaker shall meet the requirements specified in Section 26 28 00–Overcurrent Protective Devices.

2.08 ENGINE-GENERATOR SET CONTROL

- A. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
- B. The generator set-mounted controls shall include the following features and functions for control switches:
 - 1. Mode Select Switch: The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
 - 2. EMERGENCY STOP switch: Switch shall be Red “mushroom-head” pushbutton. Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting.
 - 3. RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
 - 4. PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.
- C. Generator Set AC Output Metering: The generator set shall be provided with a metering set including the following features and functions:
 - 1. Digital metering set, 1% accuracy, to indicate generator RMS voltage and current (all three phases), frequency, output current, output kW, kWh, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
 - 2. The control system shall log total number of operating hours and total kWh, as well as total values since reset.
- D. Generator Set Alarm and Status Display:
 - 1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

- a. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
 - b. The control shall include a flashing red lamp to indicate that the control is not in automatic state and red common shutdown lamp.
 - c. The control shall include an amber common warning indication lamp.
- 2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. Conditions required to be annunciated shall include:
 - a. Low oil pressure (warning).
 - b. Low oil pressure (shutdown).
 - c. Oil pressure sensor failure (warning).
 - d. Low coolant temperature (warning).
 - e. High coolant temperature (warning).
 - f. High coolant temperature (shutdown).
 - g. High oil temperature (warning).
 - h. Engine temperature sensor failure (warning).
 - i. Low coolant level (warning).
 - j. Fail to crank (shutdown).
 - k. Fail to start/overcrank (shutdown).
 - l. Overspeed (shutdown).
 - m. Low DC voltage (warning).
 - n. High DC voltage (warning).
 - o. Weak battery (warning).
 - p. High AC voltage (shutdown).
 - q. Low AC voltage (shutdown).
 - r. Under frequency (shutdown).
 - s. Overcurrent (warning).
 - t. Overcurrent (shutdown).
 - u. Short circuit (shutdown).
 - v. Overload (warning).
 - w. Emergency stop (shutdown).
 - x. (4) configurable conditions.
- 3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. All contacts shall be rated for 5 amps at 120 VAC. Relays shall be provided when necessary. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

E. Engine Status Monitoring:

- 1. The following information shall be available from a digital status panel on the generator set control:
 - a. Engine oil pressure (psi or kPA).
 - b. Engine coolant temperature (degrees F or C).
 - c. Engine oil temperature (degrees F or C).
 - d. Engine speed (rpm).
 - e. Number of hours of operation (hours).
 - f. Number of start attempts.
 - g. Battery voltage (DC volts).

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set.

F. Engine Control Functions:

1. The control system provided shall include a cycle cranking system which allows for user selected crank time, rest time, and number of cycles. Initial settings shall be for three cranking periods of 15 seconds each, with 15-second rest period between cranking periods and a 75-second overcrank lockout per NFPA 110.
2. Manual Run/Stop Control Switch: When the mode control switch is in the MANUAL position and the MANUAL RUN/STOP switch is pressed, the Generator set shall start, bypassing time delay start. If the generator set is running in the MANUAL mode, pressing the RUN/STOP switch shall cause the generator set to shut down after a cool-down at idle period.
3. The control system shall include an engine governor control which functions to provide steady state frequency regulation, as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
4. The control system shall include sensor failure monitoring logic for speed sensing, oil pressure, and engine temperature that is capable of discriminating between failed sensor or wiring components and an actual failure condition.

G. Alternator Control Functions:

1. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
2. A microprocessor-based protection device shall be provided to individually monitor all phases of the output current of the generator set and initiate an alarm (overcurrent warning) when load current exceeds 110% (adjustable) of the rated current of the generator set on any phase for more than 60 seconds (adjustable). The device shall shut down and lockout the generator set when output current level approaches the thermal damage point of the alternator (overcurrent shutdown). The protective functions provided shall be in compliance with the requirements of NFPA70 article 445.
3. A microprocessor-based protection device shall be provided to monitor all phases of the output current for short-circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lockout the generator set when output current level approaches the thermal damage point of the alternator (short-circuit shutdown). The protective functions provided shall be in compliance with the requirements of NFPA70 article 445.
4. Controls shall be provided to monitor the kW load on the generator set and initiate an alarm condition (overload) when total load on the generator set exceeds the generator

set rating for longer than 5 seconds (adjustable). Controls shall include a load shed control to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

5. A microprocessor-based AC over and undervoltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% (adjustable) of the operator-set voltage level for more than 10 seconds (adjustable), or with no intentional delay when voltage exceeds 130% (adjustable). Undervoltage shutdown shall occur when the output voltage of the alternator is less than 85% (adjustable) for more than 10 seconds (adjustable). The system shall monitor individual phases and be connected line to neutral on three-phase 4-wire generator sets and for systems that are solidly grounded.
- H. A common fail contact for remote indication at the SCADA system shall be provided. One auxiliary generator running contact shall also be provided for remote indication at the SCADA System. All contacts shall be rated for 5 amps at 120 VAC.
- I. Generator control panel shall be mounted a maximum of 5 feet 6 inches above the equipment pad. CONTRACTOR shall be responsible for all required coordination.

2.09 WEATHER-PROTECTIVE GENERATOR ENCLOSURE

- A. Generator set weather-protective housing shall be provided factory-assembled to generator set base and radiator cowl. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electrocoating paint process, or equal, meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
 1. Primer thickness 0.5 to 2.0 mils. Top coat thickness 0.8 to 1.2 mils.
 2. Gloss according to ASTM D523, 80% $\pm$ 5%. Gloss retention after 1 year shall exceed 50%.
 3. Crosshatch adhesion according to ASTM D3359, 4B-5B.
 4. Impact resistance according to ASTM D2794, 120-inch pounds to 160-inch pounds.
 5. Salt spray according to ASTM B117, 1000+ hours.
 6. Humidity according to ASTM D2247, 1000+ hours.
 7. Water soak according to ASTM D2247, 1000+ hours.
- B. Painting of hoses, clamps, wiring harnesses, and other nonmetallic service parts shall not be acceptable. Fasteners used shall be corrosion-resistant and designed to minimize marring of the painted surface when removed for normal installation of service work.
- C. The enclosure shall include hinged doors for access to both sides of the engine and alternator and the control equipment. Key locking and padlockable door latches shall be provided for all doors. All hardware and door hinges shall be stainless steel. All doors shall be provided with door stops to hold them in the open position.
- D. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure, with internal drain valves and external radiator fill provision.

- E. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure. Silencer exhaust shall include a raincap and rainshield.
- F. The generator set shall be provided with a sound-attenuated housing which allows the generator set to operate at full rated load in an ambient temperature of up to 100°F. The enclosure shall reduce the sound level of the generator set while operating at full-rated load to an average of 70 dBA at any location, 7 meters from the generator set in a free-field environment.
- G. The enclosure shall be insulated with nonhygroscopic materials.

2.10 GENERATOR EMERGENCY SHUTDOWN PUSHBUTTON CONTROL STATION

- A. Furnish a red mushroom head, maintained-type pushbutton control station for manual initiation of a generator emergency shutdown. When the emergency stop pushbutton is pressed, the generator shall shut down and remain shut down until the emergency stop pushbutton is manually reset and the generator is called to run.
- B. The control station shall be labeled "Generator Emergency Shutdown."
- C. The control station shall be provided with a NEMA 4X, stainless steel enclosure and two sets of N.O. and N.C. contacts to monitor the signal at the generator.

PART 3—EXECUTION

3.01 INSTALLATION

- A. The standby power system shall be installed as shown on the Drawings and in accordance with the manufacturer's recommendations and all applicable codes.
- B. Installation of equipment shall include providing all interconnecting wiring between all major equipment provided for the on-site power system. CONTRACTOR shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site. All connections (e.g., fuel, water, electrical) to generator shall be made with flexible material/fitting to accommodate unit vibration.
- D. Equipment shall be initially started and operated by representatives of the manufacturer.
- E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.02 FIELD START-UP AND COMMISSIONING

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist CONTRACTOR in installation and start-up of the equipment specified in this section. The manufacturer's representative shall provide technical direction and assistance to CONTRACTOR in general operation of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The manufacturer's representative shall provide inspection of the final installation. The manufacturer's representative shall perform site start-up and functional testing of the system. Upon completion of the manufacturer's start-up and testing, the manufacturer shall generate a Certificate of Proper Installation site start-up and test report, as specified in Section 01 91 00–Starting of Systems, documenting all systems checked, as well as any incomplete work remaining and operational deficiencies.
- C. CONTRACTOR shall provide a training session for up to three OWNER's representatives for one normal work day (not including start-up) at a job-site location determined by OWNER. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of instruction on operation and testing of the assembly and major components within the assembly.
- D. CONTRACTOR shall provide three copies of the manufacturer's site start-up and test report to ENGINEER for review. Once ENGINEER has reviewed the report and all equipment is operating in accordance with the specifications, ENGINEER will make one site visit to check operation of the system. If the system is not ready or does not operate as specified, OWNER shall deduct payment to CONTRACTOR and make payment to ENGINEER for additional travel, expenses, and site visits until the equipment operates as specified. CONTRACTOR shall be responsible for all fuel, and electrical costs required to check operation of the system.

3.03 TESTING

- A. In addition to the standard factory tests, there shall be a 4-hour continuous load bank test at the jobsite before connection to load transfer switch, with loads from 10% to 100% of rated capacity to check voltage, frequency, fuel, air cooling, and ventilating systems so that they can be determined adequate for the application. This test shall be accomplished with a portable three-phase resistive load bank. All emergency warning and detection equipment shall be demonstrated to be operable by simulating failures. A signed test report shall be submitted to OWNER and ENGINEER with deficiencies noted, if any. After this test, the generator shall be connected to the plant and the operation and maintenance of the unit comprehensively demonstrated to OWNER. Correct phasing between the engine-generator and station shall be checked so that it will handle load. A minimum of two power failures shall be simulated.
- B. In addition to the load bank test above, after the unit is connected to the system, three simulated outages and a 4-hour run period on the actual facility shall also be provided.

END OF SECTION

SECTION 26 32 13.2

WEST RECEIVING STATION STANDBY POWER SYSTEM

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Steel Base Assembly, Natural Gas Engine, Generator, Engine-Generator Set Controls, Environmental Systems.
- B. Related Sections and Divisions:
 - 1. Applicable provisions of Division 01 shall govern work in this section.
 - 2. The following listing of related sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. Other sections of the specifications not referenced below shall also apply to the extent required for proper performance of this work. All other sections of Division 26.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop drawings shall include the following:
 - 1. Detailed descriptions of equipment to be furnished, including all deviations from these specifications.
 - 2. Detailed layouts of all equipment and ancillary items.
 - 3. The manufacturer shall furnish schematic and wiring diagrams for the generator and an interconnection wiring diagram for the entire standby system. Test reports certified by the manufacturer shall be provided to ENGINEER for the entire system.

1.03 QUALITY ASSURANCE

- A. The generator shall be listed by Underwriters Laboratories, Inc., UL2200.

1.04 OPERATING CONDITIONS

- A. Engine-generator set shall be capable of continuous standby rating at 1,800 rpm, 0.8 PF, single-phase, 3-wire, 120/240 volts, at 60 hertz, and shall have a minimum capability of 44 kW, 44 kVA standby.
- B. The generator set manufacturer shall verify the engine is capable of driving the generator with all accessories in place and operating, at the generator set kW rating after derating for the range of temperature expected in service, and the altitude of the installation. Site conditions are 100°F maximum ambient and 650 feet altitude.
- C. Voltage regulation shall be $\pm 0.5\%$ of rated voltage for any constant load between no load and rated load.

- D. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed $\pm 1.0\%$.
- E. Random Voltage Variation: The cyclic variations in RMS voltage shall not exceed $\pm 0.5\%$ of rated voltage for constant loads from no load to rated load, with constant ambient and operating temperature.
- F. Total Harmonic Distortion: The sum of AC voltage wave-form harmonics shall meet NEMA MG1 and shall not exceed 5% of rated voltage (L-N, L-L), and no single harmonic shall exceed 3% of rated voltage.
- G. Telephone Influence Factor shall be less than 50 per NEMA MG1-22.43.
- H. The engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- I. Motor starting capability shall be a minimum of 144 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 25%.

1.05 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The AC engine-generator set shall be as manufactured by Rehlko Power System KG45 Series or Cummins Power Generation.
- B. The Drawings and Specifications were prepared based on Rehlko Power Systems with a maximum single-step voltage dip less than 15%. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 STEEL BASE ASSEMBLY

- A. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2.03 ENGINE

- A. The engine shall be stationary, liquid-cooled, for use with natural gas. The design shall be V-8, minimum displacement of 378 cubic inches, turbo charged, air cooled, as required by engine manufacturer. Engine shall be certified as capable of driving the generator of the rating indicated above on a continuous standby basis for the duration of normal source interruptions.
- B. Engine accessories shall include the following:
 - 1. A 12-volt DC electric starter as required by the engine manufacturer.
 - 2. Replaceable dry element air cleaner with restriction indicator.
 - 3. Positive displacement, mechanical, full-pressure lubrication oil pump, full-flow lubrication oil filters with replaceable elements, pressure relief valve, dipstick oil level indicator, and oil drain valve with hose extension. Provide all lubricants for proper operation of the unit.
 - 4. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, and accelerating to rated speed.
 - 5. Engine protective devices to indicate alarm and engine shutdown for the following:
 - a. Low coolant temperature alarm.
 - b. Low coolant level alarm and shutdown.
 - c. Low lubrication oil pressure alarm and shutdown.
 - d. High coolant temperature alarm and shutdown.
 - e. Over-speed shutdown.
 - f. Over-crank shutdown.
 - 6. Battery charging alternator, 130 amp minimum, with solid-state voltage regulator.
 - 7. Engine shall be radiator-cooled by engine-mounted radiator system including belt-driven pusher fan, coolant pump, and thermostat temperature control. Rotating parts shall be

guarded against accidental contact. The cooling system shall be rated for full-rated load operation in a 104°F ambient condition. Provide radiator drain extension to the side of the generator. Extension shall include shutoff valve.

8. The equipment supplier shall provide 50% ethylene glycol antifreeze solution to fill engine cooling system.
9. Engine-mounted thermostatically controlled coolant heater to aid in quick starting. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 104°F in a 40°F ambient, in compliance with NFPA 110 requirements. Heater shall be rated single-phase, 120 volts, 1,500 watts and be disconnected whenever the engine starts. Heater shall be UL 499 listed and labeled. The coolant heater(s) shall include provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. CONTRACTOR shall provide proper circuit from normal utility power source.
10. Vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer.
11. Provide a 60-watt, 120 VAC oil heater and a 10-watt, 120 VAC breather tube heater for generators located outdoors.
12. Flexible fuel lines, fuel strainer, and fuel solenoid. CONTRACTOR shall install fuel lines and fuel solenoid in accordance with manufacturer's recommendations.

2.04 ENGINE EXHAUST SYSTEM

- A. For natural gas generators rated 150 kW standby and smaller, engine emissions shall meet current Environmental Protection Agency (EPA) NSPS gas engine emission regulations. Engines shall be EPA-certified and emission approval documentation shall be provided to OWNER prior to final completion. All costs associated with any on-site EPA-required emissions testing shall be included in the Bid.
- B. Exhaust muffler shall be provided for the engine of size as recommended by manufacturer. Muffler shall be of the critical grade-type. Exhaust inlet location shall be selected by manufacturer.
- C. Stainless steel flexible exhaust connections shall be provided as required for connection between engine exhaust manifold and exhaust line in compliance with applicable codes and regulations.
- D. Provide an exhaust condensation trap with manual drain valve to trap and drain off exhaust condensation to prevent condensation from entering the engine.
- E. Provide a suitable rain cap at the stack outlet. Provide all necessary flanges and special fittings for proper installation.

2.05 BATTERY CHARGER

- A. A UL-listed/CSA-certified 10-ampere voltage regulated battery charger shall be provided for the engine-generator set.
- B. Charger shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
- C. The charger shall be compliant with UL 991 requirements for vibration resistance.

- D. The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL labeled with the maximum battery amp-hour rating that can be recharged within 24 hours. The label shall indicate that the charger is suitable for charging of 200 AH batteries in accordance with NFPA requirements.
- E. The charger shall incorporate a 4-rate charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100% of charge, and a float stage to maintain a fully charged battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer. Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.
- F. The DC output voltage regulation shall be within $\pm 1\%$. The DC output ripple current shall not exceed 1 amp at rated output current level.
- G. The charger shall include the following features:
 - 1. Two-line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming.
 - 2. LED indicating lamps to indicate normal charging (green), equalize charge state (amber), and fault condition (red).
 - 3. AC input overcurrent, over voltage, and under voltage protection.
 - 4. DC output overcurrent protection.
 - 5. Alarm output relay.
 - 6. Corrosive-resistant aluminum enclosure.

2.06 STARTING AND CONTROL BATTERIES

- A. A calcium/lead antimony storage battery set of the heavy-duty starting-type shall be provided. Battery voltage shall be compatible with starting system. The battery set shall be rated no less than 630 CCA and shall be capable of a minimum of three 15-second cranking cycles. A battery rack constructed in conformance with NEC requirements and necessary cables and clamps shall be provided.

2.07 GENERATOR

- A. The generator shall be a single prelubricated bearing, self-aligning, 4-pole, two-thirds pitch, brushless, synchronous-type, revolving field with amortisseur windings, and with direct driven centrifugal blower fan for proper cooling and minimum noise. No brushes will be allowed. Generator shall be directly connected to engine fly wheel housing and driven through a flexible coupling to provide permanent alignment. Generator design shall prevent potentially damaging shaft currents.
- B. Insulation shall meet NEMA standards for Class H and shall be UL 1446 listed. The maximum temperature rise shall not exceed 130°C at 40°C ambient.
- C. The generator shall be single-phase, broad-range, reconnectable and shall have 12 leads brought out to allow connection by user to obtain any of the available voltages for the unit.

- D. The generator set shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5% above or below rated voltage.
- E. Generators shall utilize a permanent magnet generator (PMG) to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single-phase or three-phase fault at approximately 300% of rated current for not more than 10 seconds.
- F. The subtransient reactance of the alternator shall not exceed 15%, based on the standby rating of the generator set.
- G. Provide a 225-amp mainline circuit breaker with the engine-generator set. Circuit breaker shall meet the requirements specified in Section 26 28 00—Overcurrent Protective Devices.

2.08 ENGINE-GENERATOR SET CONTROL

- A. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
- B. The generator set-mounted controls shall include the following features and functions for control switches:
 - 1. Mode Select Switch: The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
 - 2. EMERGENCY STOP switch: Switch shall be Red “mushroom-head” pushbutton. Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting.
 - 3. RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
 - 4. PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.
- C. Generator Set AC Output Metering: The generator set shall be provided with a metering set including the following features and functions:
 - 1. Digital metering set, 1% accuracy, to indicate generator RMS voltage and current, frequency, output current, output kW, kWh, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all single-phase voltages (line to neutral or line to line) simultaneously.
 - 2. The control system shall log total number of operating hours and total kWh, as well as total values since reset.
- D. Generator Set Alarm and Status Display:
 - 1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

- a. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
- b. The control shall include a flashing red lamp to indicate that the control is not in automatic state and red common shutdown lamp.
- c. The control shall include an amber common warning indication lamp.
- 2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. Conditions required to be annunciated shall include:
 - a. Low oil pressure (warning).
 - b. Low oil pressure (shutdown).
 - c. Oil pressure sensor failure (warning).
 - d. Low coolant temperature (warning).
 - e. High coolant temperature (warning).
 - f. High coolant temperature (shutdown).
 - g. High oil temperature (warning).
 - h. Engine temperature sensor failure (warning).
 - i. Low coolant level (warning).
 - j. Fail to crank (shutdown).
 - k. Fail to start/overcrank (shutdown).
 - l. Overspeed (shutdown).
 - m. Low DC voltage (warning).
 - n. High DC voltage (warning).
 - o. Weak battery (warning).
 - p. High AC voltage (shutdown).
 - q. Low AC voltage (shutdown).
 - r. Under frequency (shutdown).
 - s. Overcurrent (warning).
 - t. Overcurrent (shutdown).
 - u. Short circuit (shutdown).
 - v. Overload (warning).
 - w. Emergency stop (shutdown).
 - x. (4) configurable conditions.
- 3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. All contacts shall be rated for 5 amps at 120 VAC. Relays shall be provided when necessary. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

E. Engine Status Monitoring:

- 1. The following information shall be available from a digital status panel on the generator set control:
 - a. Engine oil pressure (psi or kPA).
 - b. Engine coolant temperature (degrees F or C).
 - c. Engine oil temperature (degrees F or C).
 - d. Engine speed (rpm).
 - e. Number of hours of operation (hours).
 - f. Number of start attempts.
 - g. Battery voltage (DC volts).

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set.

F. Engine Control Functions:

1. The control system provided shall include a cycle cranking system which allows for user selected crank time, rest time, and number of cycles. Initial settings shall be for three cranking periods of 15 seconds each, with 15-second rest period between cranking periods and a 75-second overcrank lockout per NFPA 110.
2. Manual Run/Stop Control Switch: When the mode control switch is in the MANUAL position and the MANUAL RUN/STOP switch is pressed, the Generator set shall start, bypassing time delay start. If the generator set is running in the MANUAL mode, pressing the RUN/STOP switch shall cause the generator set to shut down after a cool-down at idle period.
3. The control system shall include an engine governor control which functions to provide steady state frequency regulation, as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
4. The control system shall include sensor failure monitoring logic for speed sensing, oil pressure, and engine temperature that is capable of discriminating between failed sensor or wiring components and an actual failure condition.

G. Alternator Control Functions:

1. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with single-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
2. A microprocessor-based protection device shall be provided to individually monitor all phases of the output current of the generator set and initiate an alarm (overcurrent warning) when load current exceeds 110% (adjustable) of the rated current of the generator set on any phase for more than 60 seconds (adjustable). The device shall shut down and lockout the generator set when output current level approaches the thermal damage point of the alternator (overcurrent shutdown). The protective functions provided shall be in compliance with the requirements of NFPA70 article 445.
3. A microprocessor-based protection device shall be provided to monitor all phases of the output current for short-circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lockout the generator set when output current level approaches the thermal damage point of the alternator (short-circuit shutdown). The protective functions provided shall be in compliance with the requirements of NFPA70 article 445.
4. Controls shall be provided to monitor the kW load on the generator set and initiate an alarm condition (overload) when total load on the generator set exceeds the generator

set rating for longer than 5 seconds (adjustable). Controls shall include a load shed control to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

5. A microprocessor-based AC over and undervoltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% (adjustable) of the operator-set voltage level for more than 10 seconds (adjustable), or with no intentional delay when voltage exceeds 130% (adjustable). Undervoltage shutdown shall occur when the output voltage of the alternator is less than 85% (adjustable) for more than 10 seconds (adjustable). The system shall monitor individual phases and be connected line to neutral on single-phase 3-wire generator sets and for systems that are solidly grounded.
- H. A common fail contact for remote indication at the SCADA system shall be provided. One auxiliary generator running contact shall also be provided for remote indication at the SCADA System. All contacts shall be rated for 5 amps at 120 VAC.
- I. Generator control panel shall be mounted a maximum of 5 feet 6 inches above the equipment pad. CONTRACTOR shall be responsible for all required coordination.

2.09 WEATHER-PROTECTIVE GENERATOR ENCLOSURE

- A. Generator set weather-protective housing shall be provided factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electrocoating paint process, or equal, meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
 1. Primer thickness 0.5 to 2.0 mils. Top coat thickness 0.8 to 1.2 mils.
 2. Gloss according to ASTM D523, 80% $\pm$ 5%. Gloss retention after 1 year shall exceed 50%.
 3. Crosshatch adhesion according to ASTM D3359, 4B-5B.
 4. Impact resistance according to ASTM D2794, 120-inch pounds to 160-inch pounds.
 5. Salt spray according to ASTM B117, 1000+ hours.
 6. Humidity according to ASTM D2247, 1000+ hours.
 7. Water soak according to ASTM D2247, 1000+ hours.
- B. Painting of hoses, clamps, wiring harnesses, and other nonmetallic service parts shall not be acceptable. Fasteners used shall be corrosion-resistant and designed to minimize marring of the painted surface when removed for normal installation of service work.
- C. The enclosure shall include hinged doors for access to both sides of the engine and alternator and the control equipment. Key locking and padlockable door latches shall be provided for all doors. All hardware and door hinges shall be stainless steel. All doors shall be provided with door stops to hold them in the open position.
- D. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure, with internal drain valves and external radiator fill provision.

- E. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure. Silencer exhaust shall include a raincap and rainshield.
- F. The generator set shall be provided with a sound-attenuated housing which allows the generator set to operate at full rated load in an ambient temperature of up to 100°F. The enclosure shall reduce the sound level of the generator set while operating at full-rated load to an average of 70 dBA at any location, 7 meters from the generator set in a free-field environment.
- G. The enclosure shall be insulated with nonhygroscopic materials.

2.10 GENERATOR EMERGENCY SHUTDOWN PUSHBUTTON CONTROL STATION

- A. Furnish a red mushroom head, maintained-type pushbutton control station for manual initiation of a generator emergency shutdown. When the emergency stop pushbutton is pressed, the generator shall shut down and remain shut down until the emergency stop pushbutton is manually reset and the generator is called to run.
- B. The control station shall be labeled "Generator Emergency Shutdown."
- C. The control station shall be provided with a NEMA 4X, stainless steel enclosure and two sets of N.O. and N.C. contacts to monitor the signal at the generator.

PART 3—EXECUTION

3.01 INSTALLATION

- A. The standby power system shall be installed as shown on the Drawings and in accordance with the manufacturer's recommendations and all applicable codes.
- B. Installation of equipment shall include providing all interconnecting wiring between all major equipment provided for the on-site power system. CONTRACTOR shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site. All connections (e.g., fuel, water, electrical) to generator shall be made with flexible material/fitting to accommodate unit vibration.
- D. Equipment shall be initially started and operated by representatives of the manufacturer.
- E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.02 FIELD START-UP AND COMMISSIONING

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist CONTRACTOR in installation and start-up of the equipment specified in this section. The manufacturer's representative shall provide technical direction and assistance to CONTRACTOR in general operation of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The manufacturer's representative shall provide inspection of the final installation. The manufacturer's representative shall perform site start-up and functional testing of the system. Upon completion of the manufacturer's start-up and testing, the manufacturer shall generate a Certificate of Proper Installation site start-up and test report, as specified in Section 01 91 00–Starting of Systems, documenting all systems checked, as well as any incomplete work remaining and operational deficiencies.
- C. CONTRACTOR shall provide a training session for up to three OWNER's representatives for one normal work day (not including start-up) at a job-site location determined by OWNER. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of instruction on operation and testing of the assembly and major components within the assembly.
- D. CONTRACTOR shall provide three copies of the manufacturer's site start-up and test report to ENGINEER for review. Once ENGINEER has reviewed the report and all equipment is operating in accordance with the specifications, ENGINEER will make one site visit to check operation of the system. If the system is not ready or does not operate as specified, OWNER shall deduct payment to CONTRACTOR and make payment to ENGINEER for additional travel, expenses, and site visits until the equipment operates as specified. CONTRACTOR shall be responsible for all fuel, and electrical costs required to check operation of the system.

3.03 TESTING

- A. In addition to the standard factory tests, there shall be a 4-hour continuous load bank test at the jobsite before connection to load transfer switch, with loads from 10% to 100% of rated capacity to check voltage, frequency, fuel, air cooling, and ventilating systems so that they can be determined adequate for the application. This test shall be accomplished with a portable single-phase resistive load bank. All emergency warning and detection equipment shall be demonstrated to be operable by simulating failures. A signed test report shall be submitted to OWNER and ENGINEER with deficiencies noted, if any. After this test, the generator shall be connected to the plant and the operation and maintenance of the unit comprehensively demonstrated to OWNER. Correct phasing between the engine-generator and station shall be checked so that it will handle load. A minimum of two power failures shall be simulated.
- B. In addition to the load bank test above, after the unit is connected to the system, three simulated outages and a one-hour run period on the actual facility shall also be provided.

END OF SECTION

SECTION 26 35 26

HARMONIC FILTERS

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Active Harmonic Filters.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of electrical equipment of the types and ratings necessary, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.
- D. UL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures.
- E. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute and other standards pertaining to material, construction, and testing, where applicable.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Submit product data indicating system and component construction, ratings, and operating parameters.
- C. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed equipment.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Section 01 60 00–Materials and Equipment.
- B. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

- C. Handle using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet or snow, if handled in inclement weather.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ACTIVE HARMONIC FILTER

- A. Active harmonic filters shall be power electronic devices, which consist of power semiconductors and a DC bus that injects current into the AC line to conceal undesirable harmonic currents drawn by loads on the AC line. The DC bus shall store power for power semiconductor switching. A digital microcontroller shall control the operation of the power converter.
- B. Active harmonic filters shall be UL listed.
- C. Active harmonic filters shall have fully digital synchronous frame controls for selected harmonics to enhance drive load compatibility.
- D. Active harmonic filters shall have a fully digital, broadband current regulator with progressive gains to eliminate system resonance tuning issues.
- E. Active harmonic filters shall have a single processor for control of all power electronic devices via a single active filter to reduce fault response latency and harmonic correction loop times. Active harmonic filters shall be capable of a parallel configuration with up to six active harmonic filters.
- F. Active harmonic filters shall have molded case circuit breaker overcurrent protection and current limiting self-protection. Operation shall continue indefinitely at manufacturer defined safe operating levels without tripping or damage to the active harmonic filter. Molded case

circuit breakers shall have a minimum symmetrical interrupting capacity of 42,000. Molded case circuit breakers shall be manufactured by ABB, Allen-Bradley, Eaton, or equal.

- G. Active harmonic filters shall have surge protection meeting ANSI C62.42.
- H. Active harmonic filter shall have built in redundancy such that at least one half of the corrective current capacity is available after a normal single point fault.
- I. All inductive elements in the power circuit of active harmonic filters shall be coreless, to maintain constant inductance and to mitigate saturation at high current levels.
- J. Active harmonic filters shall have a harmonic cancellation spectrum to the 50th harmonic. Active harmonic filters shall have power factor correction capability of up to 0.98 lagging power factor.
- K. Active harmonic filters shall have two distinct levels of faults employed: Critical and Non-critical levels. Non-critical level faults shall provide automatic restart of the active harmonic filter and return the active harmonic filter to normal operation upon automatic fault clearance. Critical level faults shall stop the function of the active harmonic filter and shall require manual reset at the active harmonic filter to restart the unit.
 - 1. Non-critical faults, such as AC line power loss, shall be automatically restarted upon restoration of AC line power. Upon removal of non-critical fault conditions, the active harmonic filters line conditioner shall restart without user action.
 - 2. All other faults shall be considered critical faults and shall stop the active harmonic filter. The run relay shall be disabled, and the fault relay shall be enabled under a critical fault condition. Manual reset shall be required to initiate a power reset (e.g., cycle power off and on) to restart the active harmonic filter.
- L. Active harmonic filters shall have programed logic that shall monitor the load current by utilizing a minimum of two current transformers (CTs) mounted on phases A and C to direct the function of the power electronic converter. Current transformers shall be rated for 400 Hz. Provide split-core CTs as recommended by the manufacturer.
- M. Active harmonic filters response time in a steady state condition shall be less than one line cycle. In the event of a load change or transient condition, the response time shall be within three line cycles.
- N. Controls:
 - 1. Interface to active harmonic filters shall be via a digital HMI operator interface module with integral display. Display shall be a color touch screen, minimum 5.6-inch display size, 65k colors, and shall have an LED backlight. HMI graphics shall include Home, Status, Fault, and Setup screens and display voltage data, current waveform data, total harmonic distortion (THD) data, and RMS current and voltage metering data. HMI graphics shall have gauge based indicators of active filter current usage from 0 to 100% of capacity, dual stage indications of normal operation and "at capacity" operation, and an alarm history buffer saved in non-volatile memory. Operator interface module shall allow the ability to set the line/load CT ratio of the active harmonic filter system.
 - 2. Active harmonic filters shall have the ability to operate in three modes: (1) harmonic correction only mode, (2) power factor correction only mode, or (3) combination harmonic and power factor correction mode. All three control modes shall be configurable from the local operator touch screen display.

3. Active harmonic filters shall include a configurable relay-based run/stop common input in addition to manual and automatic run/stop commands.
 4. Active harmonic filters shall have configurable relays for "Running," "Fault," "Power On," and "At Current Limit" outputs (4 total). Relay contacts shall be rated for 2 amperes at 250 volts.
 5. Active harmonic filters shall have a configurable network based run/stop command input in addition to manual and auto run/stop commands. Network based communication shall be Allen-Bradley EtherNet/IP.
 6. Active harmonic filters shall have the ability to load and save operational parameters in non-volatile, persistent memory and the ability to revert to factory default parameter settings.
 7. Active harmonic filters shall automatically begin to correct harmonic currents after power up without the need for operator intervention.
- O. Active harmonic filters shall be furnished with a standalone, floor-mounted, NEMA 1 enclosure where shown on the Drawings. Active harmonic filters digital HMI operator interface module shall be factory installed on the enclosure door.
- P. Active harmonic filters shall be manufactured by TCI, model ALC, or equal. Active harmonic filters shall provide 50 amps at 480-volt, three-phase compensation capacity.

PART 3-EXECUTION

3.01 INSTALLATION

- A. CONTRACTOR shall install all equipment according to the manufacturer's recommendations and the Contract Drawings.
- B. All necessary hardware to secure the assembly in place shall be provided by CONTRACTOR.

3.02 FIELD QUALITY CONTROL

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist CONTRACTOR in installation of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to CONTRACTOR in connections, and adjustments, and testing of the assembly and components contained herein.

3.03 MANUFACTURER'S CERTIFICATION

- A. CONTRACTOR shall obtain the services of a manufacturer's representative to start-up and calibrate the harmonic filter. Manufacturer's representative shall provide a certified start-up report at the completion of start-up.
- B. CONTRACTOR shall provide an electronic copy of the manufacturer's representative's certification before final payment is made.

3.04 TRAINING

- A. CONTRACTOR shall provide training for OWNER's personnel at the job site location.

- B. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of the instruction on the operation and maintenance of the equipment as well as explanation of major components within the assembly.

END OF SECTION

SECTION 26 36 24.1

EAST RECEIVING STATION SERVICE ENTRANCE-RATED AUTOMATIC TRANSFER SWITCHES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Provide an automatic transfer switch where shown on the Drawings.
 - 2. The system shall be a completely integrated assembly for automatic, unattended operation and control of the standby power system. System operation shall be as described in the following sections.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop drawings shall include the following:
 - 1. Detailed descriptions of equipment to be furnished, including all deviations from these specifications.
 - 2. Detailed layouts of all cubicles and equipment.
 - 3. The manufacturer shall furnish schematic and wiring diagrams for the automatic transfer switch and an interconnection wiring diagram for the entire standby system. Test reports certified by the manufacturer shall be provided to ENGINEER for the entire system.

1.03 QUALITY ASSURANCE

- A. The transfer switch shall be listed by Underwriters Laboratories, Inc.

1.04 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be

included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The service entrance-rated automatic transfer switch shall be as manufactured by Rehlko Power Systems Model KUP or Cummins Power Generation, 1000-amp, 3-pole, or equal.
- B. The Drawings and Specifications were prepared based on Rehlko Power Systems. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 SERVICE ENTRANCE-RATED AUTOMATIC TRANSFER SWITCHES

- A. One complete service entrance-rated automatic transfer switch shall be provided. Interlocked molded case circuit breakers are not acceptable. Service entrance-rated transfer switch shall consist of a molded case circuit breaker and an automatic transfer switch. Molded case circuit breaker shall be service entrance-rated, be 100% rated, and be located on the line side of the transfer switch. The circuit breaker shall be integral to the transfer switch, be UL 489 listed, and meet the requirements of Section 26 28 00—Overcurrent Protective Devices.
- B. For transfer switches with overcurrent protective device rated 1200 amps or higher, provide an Energy Reduction Maintenance Switch (ERMS).
- C. The transfer switch shall be capable of switching all classes of load and shall be rated for continuous duty when installed in a nonventilated enclosure constructed in accordance with Underwriters Laboratories, Inc., Standard UL-1008. The transfer switch shall be provided with a NEMA 1 enclosure.
- D. Provide neutral landing lugs for all automatic transfer switches accepting utility service-entrance conductors. Neutral landing lugs shall be bonded to the ground bus at the utility service entrance, unless otherwise noted.
- E. The transfer switch shall include an integral surge protective device for both the normal and standby sources. SPD shall be as manufactured by Rehlko, or equal.

2.03 CONSTRUCTION AND PERFORMANCE

- A. The transfer switch shall be double-throw, actuated by a single electrical operator momentarily energized and connected to the transfer mechanism by a simple overcenter linkage, with a minimum transfer time of 400 milliseconds.
- B. The transfer switch shall have the ability to detect under and over-voltage, under and over-frequency, voltage imbalance, incorrect phase rotation, and phase loss.
- C. The time delay between the opening of the closed contacts and the closing of the open contacts shall allow for voltage decay before transfer.
- D. The transfer switch shall allow the motor and transformer loads to be reenergized after transfer with normal inrush current. The transfer switch shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals.
- E. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and standby positions without the use of hooks, latches, magnets, or springs and shall be silver tungsten alloy. All contacts shall be 100% rated. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches.
- F. The transfer switch shall be equipped with a safe manual operator designed to prevent injury to operating personnel. The manual operator shall provide the same transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.
- G. The transfer switch shall be equipped with a digital display that has the ability to monitor load power conditions, network status, review transfer switch events, and adjust transfer switch parameters. The display shall also include a bar graph display that indicates the level of power being supplied to the load as well as three-phase voltage, current, frequency, power factor, and kilowatts.
- H. Provide a current transducer (CT), as manufactured by Veris Industries, Hawkeye H-Series, or equal, with 4-20 mA output for installation on the phase B conductors from the transfer switch to the generator.

2.04 SEQUENCE OF OPERATION

- A. Engine starting contacts shall be provided to start the standby power source should the voltage of the normal source drop below 80% on any phase after an adjustable time delay of 0.5-3 seconds to allow for momentary dips. The transfer switch shall transfer to standby when 90% of rated voltage and frequency has been reached. After restoration of normal power on all phases to 90% of rated voltage, an adjustable time delay period of zero to 31 minutes shall delay retransfer to allow stabilization of normal power. If the standby power source should fail during this time delay period, the switch shall automatically return to the normal source. After retransfer to normal, the engine-generator shall be allowed to operate at no load for a period of 5 minutes. Two auxiliary contacts rated 25 amps, 120 volts shall be mounted on the main shaft; one closed on normal, the other closed on standby. All relays, timers, control wiring, and accessories shall be front accessible. In addition, one set of relay contacts shall be provided to open upon loss of the normal power supply. All control wire terminations are to be identified by tubular sleeve-type markers.

- B. The automatic transfer switch shall include the following functions. Adjustable time delays and features described below shall be operator adjustable from the front of the transfer switch, and shall not require the use of a laptop, software, or external programming device.
1. Time delay to override momentary normal source power outages to delay engine start signal and transfer switch operation. Adjustable 0.5 to 90 seconds.
 2. Time delay relays to control contact transition time on transfer to either source, adjustable 1 to 300 seconds (Programmed Transition).
 3. Time delay on retransfer to normal. Adjustable 0-31 minutes, with engine overrun to provide fixed 5-minute unloaded engine operation after retransfer to normal.
 4. Test with load-Auto-Test without load selector switch to simulate normal power failure. (Maintained Type).*
 5. Contact to close on failure of normal source to initiate engine starting or other customer functions.
 6. Contact to open on failure of normal source to initiate engine starting or other customer functions.
 7. Green pilot light to indicate switch in normal position.*
 8. Red pilot light to indicate switch in standby position.*
 9. Auxiliary contact closed in normal position.
 10. Auxiliary contact closed in standby position.
 11. Adjustable relay to prevent transfer to standby until voltage and frequency of the standby power source have reached acceptable limits.
 12. Exerciser for the standby power source with 7-day time clock, multiple test schedules, and programmable exceptions for holidays, weekends, etc.

* Front cabinet door mounted.

- C. When coordinated with circuit breakers, the automatic transfer switch shall have the following short circuit withstand capability:

Withstand Capability (RMS Amps, Symmetrical) Testing at 480 VAC		
Circuit Breaker Ampere Rating	Transfer Switch Ampere Rating	ATS Coordinated with Molded Case Circuit Breakers
1,000	1,000	42,000

- D. During the withstand tests, there shall be no contact welding or damage. The tests shall be performed on identical samples without the use of current limiting fuses. Oscillograph traces across the main contacts shall verify that contact separation has not occurred. These procedures shall be in accordance with UL 1008 and testing shall be certified by Underwriters Laboratories or any nationally-recognized independent testing laboratory.
- E. When conducting temperature rise tests to UL 1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full-rated current after completing the overload and endurance tests.
- F. As a precondition for approval, the manufacturer of the automatic transfer switch shall verify that their switches are listed by Underwriters Laboratories, Inc., Std. UL 1008 with withstand and close-in values at least equal to the interrupting rating of the circuit breaker and/or fuse that is specified to protect the circuit.

PART 3–EXECUTION

3.01 INSTALLATION

- A. The installation of this system shall comply with the directions and recommendations of authorized factory representatives. These representatives shall offer the supervision necessary for proper installation.
- B. A final inspection and an initial start-up of the system shall be provided by the factory representatives.
- C. A Certificate of Proper Installation, as specified in Section 01 91 00–Starting of Systems, shall be provided by the authorized factory representatives which states that the system is properly installed and does properly function as recommended by the factory and as described herein shall be submitted to ENGINEER.
- D. A test run shall be performed by the authorized factory representatives in the presence of CONTRACTOR and ENGINEER or their representatives; the time of this test run shall be mutually agreed upon by all persons concerned.

3.02 STARTUP AND TRAINING

- A. CONTRACTOR shall include 8 hours of start-up by a certified, factory-trained engineer. Start-up services shall include, but not be limited to, inspection of CONTRACTOR installation and functional testing of the ATS assembly. On-site time shall be over-and-above the cost of travel and travel time to the site.
- B. CONTRACTOR shall provide a training session for up to three OWNER's representatives for one normal workday (not including start-up) at a job site location determined by OWNER. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of instruction on operation and testing of the assembly, simulated outages, and review of major components within the assembly.

END OF SECTION

SECTION 26 36 24.2

WEST RECEIVING STATION SERVICE ENTRANCE-RATED AUTOMATIC TRANSFER SWITCHES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Provide an automatic transfer switch where shown on the Drawings.
 - 2. The system shall be a completely integrated assembly for automatic, unattended operation and control of the standby power system. System operation shall be as described in the following sections.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop drawings shall include the following:
 - 1. Detailed descriptions of equipment to be furnished, including all deviations from these specifications.
 - 2. Detailed layouts of all cubicles and equipment.
 - 3. The manufacturer shall furnish schematic and wiring diagrams for the automatic transfer switch and an interconnection wiring diagram for the entire standby system. Test reports certified by the manufacturer shall be provided to ENGINEER for the entire system.

1.03 QUALITY ASSURANCE

- A. The transfer switch shall be listed by Underwriters Laboratories, Inc.

1.04 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The service entrance-rated automatic transfer switch shall be as manufactured by Rehlko Power Systems Model KUP or Cummins Power Generation, 225-amp, 3-pole, or equal.
- B. The Drawings and Specifications were prepared based on Rehlko Power Systems. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 SERVICE ENTRANCE-RATED AUTOMATIC TRANSFER SWITCHES

- A. One complete service entrance-rated automatic transfer switch shall be provided. Interlocked molded case circuit breakers are not acceptable. Service entrance-rated transfer switch shall consist of a molded case circuit breaker and an automatic transfer switch. Molded case circuit breaker shall be service entrance-rated, be 100% rated, and be located on the line side of the transfer switch. The circuit breaker shall be integral to the transfer switch, be UL 489 listed, and meet the requirements of Section 26 28 00-Overcurrent Protective Devices.
- B. The transfer switch shall be capable of switching all classes of load and shall be rated for continuous duty when installed in a nonventilated enclosure constructed in accordance with Underwriters Laboratories, Inc., Standard UL-1008. The transfer switch shall be provided with a NEMA 1 enclosure.
- C. Provide neutral landing lugs for all automatic transfer switches accepting utility service-entrance conductors. Neutral landing lugs shall be bonded to the ground bus at the utility service entrance, unless otherwise noted.
- D. The transfer switch shall include an integral surge protective device for both the normal and standby sources. SPD shall be as manufactured by Rehlko, or equal.

2.03 CONSTRUCTION AND PERFORMANCE

- A. The transfer switch shall be double-throw, actuated by a single electrical operator momentarily energized and connected to the transfer mechanism by a simple overcenter linkage, with a minimum transfer time of 400 milliseconds.
- B. The transfer switch shall have the ability to detect under and over-voltage, under and over-frequency, voltage imbalance, incorrect phase rotation, and phase loss.

- C. The time delay between the opening of the closed contacts and the closing of the open contacts shall allow for voltage decay before transfer.
- D. The transfer switch shall allow the motor and transformer loads to be reenergized after transfer with normal inrush current. The transfer switch shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals.
- E. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and standby positions without the use of hooks, latches, magnets, or springs and shall be silver tungsten alloy. All contacts shall be 100% rated. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches.
- F. The transfer switch shall be equipped with a safe manual operator designed to prevent injury to operating personnel. The manual operator shall provide the same transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.
- G. The transfer switch shall be equipped with a digital display that has the ability to monitor load power conditions, network status, review transfer switch events, and adjust transfer switch parameters. The display shall also include a bar graph display that indicates the level of power being supplied to the load as well as single-phase voltage, current, frequency, power factor, and kilowatts.

2.04 SEQUENCE OF OPERATION

- A. Engine starting contacts shall be provided to start the standby power source should the voltage of the normal source drop below 80% on any phase after an adjustable time delay of 0.5-3 seconds to allow for momentary dips. The transfer switch shall transfer to standby when 90% of rated voltage and frequency has been reached. After restoration of normal power on all phases to 90% of rated voltage, an adjustable time delay period of zero to 31 minutes shall delay retransfer to allow stabilization of normal power. If the standby power source should fail during this time delay period, the switch shall automatically return to the normal source. After retransfer to normal, the engine-generator shall be allowed to operate at no load for a period of 5 minutes. Two auxiliary contacts rated 25 amps, 120 volts shall be mounted on the main shaft; one closed on normal, the other closed on standby. All relays, timers, control wiring, and accessories shall be front accessible. In addition, one set of relay contacts shall be provided to open upon loss of the normal power supply. All control wire terminations are to be identified by tubular sleeve-type markers.
- B. The automatic transfer switch shall include the following functions. Adjustable time delays and features described below shall be operator adjustable from the front of the transfer switch, and shall not require the use of a laptop, software, or external programming device.
 - 1. Time delay to override momentary normal source power outages to delay engine start signal and transfer switch operation. Adjustable 0.5 to 90 seconds.
 - 2. Time delay relays to control contact transition time on transfer to either source, adjustable 1 to 300 seconds (Programmed Transition).
 - 3. Time delay on retransfer to normal. Adjustable 0-31 minutes, with engine overrun to provide fixed 5-minute unloaded engine operation after retransfer to normal.
 - 4. Test with load-Auto-Test without load selector switch to simulate normal power failure. (Maintained Type).*
 - 5. Contact to close on failure of normal source to initiate engine starting or other customer functions.

6. Contact to open on failure of normal source to initiate engine starting or other customer functions.
7. Green pilot light to indicate switch in normal position.*
8. Red pilot light to indicate switch in standby position.*
9. Auxiliary contact closed in normal position.
10. Auxiliary contact closed in standby position.
11. Adjustable relay to prevent transfer to standby until voltage and frequency of the standby power source have reached acceptable limits.
12. Exerciser for the standby power source with 7-day time clock, multiple test schedules, and programmable exceptions for holidays, weekends, etc.

* Front cabinet door mounted.

- C. When coordinated with circuit breakers, the automatic transfer switch shall have the following short circuit withstand capability:

Withstand Capability (RMS Amps, Symmetrical) Testing at 240 VAC		
Circuit Breaker Ampere Rating	Transfer Switch Ampere Rating	ATS Coordinated with Molded Case Circuit Breakers
250	250	22,000

- D. During the withstand tests, there shall be no contact welding or damage. The tests shall be performed on identical samples without the use of current limiting fuses. Oscillograph traces across the main contacts shall verify that contact separation has not occurred. These procedures shall be in accordance with UL 1008 and testing shall be certified by Underwriters Laboratories or any nationally-recognized independent testing laboratory.
- E. When conducting temperature rise tests to UL 1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full-rated current after completing the overload and endurance tests.
- F. As a precondition for approval, the manufacturer of the automatic transfer switch shall verify that their switches are listed by Underwriters Laboratories, Inc., Std. UL 1008 with withstand and close-in values at least equal to the interrupting rating of the circuit breaker and/or fuse that is specified to protect the circuit.

PART 3—EXECUTION

3.01 INSTALLATION

- A. The installation of this system shall comply with the directions and recommendations of authorized factory representatives. These representatives shall offer the supervision necessary for proper installation.
- B. A final inspection and an initial start-up of the system shall be provided by the factory representatives.
- C. A Certificate of Proper Installation, as specified in Section 01 91 00—Starting of Systems, shall be provided by the authorized factory representatives which states that the system is properly installed and does properly function as recommended by the factory and as described herein shall be submitted to ENGINEER.

- D. A test run shall be performed by the authorized factory representatives in the presence of CONTRACTOR and ENGINEER or their representatives; the time of this test run shall be mutually agreed upon by all persons concerned.

3.02 STARTUP AND TRAINING

- A. CONTRACTOR shall include 8 hours of start-up by a certified, factory-trained engineer. Start-up services shall include, but not be limited to, inspection of CONTRACTOR installation and functional testing of the ATS assembly. On-site time shall be over-and-above the cost of travel and travel time to the site.
- B. CONTRACTOR shall provide a training session for up to three OWNER's representatives for one normal workday (not including start-up) at a job site location determined by OWNER. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of instruction on operation and testing of the assembly, simulated outages, and review of major components within the assembly.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTIVE DEVICES (SPD)

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Service Entrance Devices.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ANSI/IEEE C62.41 and C62.45.
- B. NFPA 70 and 75.
- C. UL 1449, most recent issue.

1.03 QUALITY ASSURANCE

- A. Manufacturers of SPDs: Firms regularly engaged in the manufacture of these products of the types and ratings whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide surge protective devices which have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, wiring diagram, outline drawing, and construction diagram as described in ANSI/NEMA ICS 1. Test reports certified by the manufacturer shall be provided to ENGINEER upon request for each model submitted.

1.05 WARRANTIES

- A. Manufacturer shall provide a minimum 10-year warranty from the date of Substantial Completion to cover repair or replacement of the device.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The Drawings and Specifications were prepared based on MCG. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, upsizing overcurrent protective devices to meet manufacturer recommendations. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 GENERAL

- A. These specifications describe the electrical and mechanical requirements for high energy SPDs.
- B. The system individual units shall be UL listed under UL1449, latest edition, Standard for Surge Protective Devices (SPD). Surge ratings shall be permanently affixed to the SPD.
- C. Operating Temperature: Operating temperature range shall be -40 to +70°C (-40 to 158°F).
- D. Storage Temperature: Storage temperature range shall be -40 to +85°C.
- E. Relative Humidity: Operation shall be reliable in an environment with 0% to 95% noncondensing relative humidity.
- F. Operating Altitude: The system shall be capable of operation up to an altitude of 13,000 feet above sea level.
- G. Design Life: >15 years.

- H. Operating Voltage: Maximum continuous operating voltage shall be no less than 125% of the nominal rated line voltage.
- I. Power Frequency: SPD power frequency shall be rated for use on 50 and 60 Hertz power systems.
- J. All SPDs shall be MOV type. Noise filtering capabilities shall be provided as an option for the devices specified herein.

2.03 SERVICE ENTRANCE DEVICES

- A. The maximum surge current capacity of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least 160 kA per phase. The surge life for WYE models (8/20) shall be at least 10kA for 1,500 occurrences (Lx-N & Lx-G modes) and 30kA for 1,500 occurrences (N-G mode). The surge life for delta models (8/20) shall be at least 20kA for 1,500 occurrences (Lx-G modes) and 20kA for 1,500 occurrences (Lx-Lx mode). The transient suppression capability shall be bidirectional and suppress both positive and negative impulses. SPD shall have a nominal discharge rating (I_n) of 40 kA.
- B. The SPD shall have a minimum Short Circuit Rating (SCCR) of 200 KAIC. The interrupt capability must be confirmed and documented by a recognized independent testing laboratory.
- C. The suppressor shall be designed so as to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed as shown in the manufacturer's installation notes for best performance.
- D. The system shall be constructed using field replaceable plug-in modules. The module shall consist of multiple fuse protected metal oxide varistors. The status of each module shall be locally monitored with a red LED that will illuminate if the module protection is reduced. Protector shall provide redundant protection within each phase module with multiple surge rated fuses per module or one fuse per MOV.
- E. Red and green solid-state LED indicators shall be provided on the hinged front cover to indicate protection status. An illuminated green LED indicates power is present at the protector on all phases, and an illuminated red LED shall indicate that one or more of the modules have reduced protection. Both front panel and internal LEDs are required to provide power and fault indications. Relay operation shall be in a failsafe operating mode, i.e., continuously energized so that power failure, reduced protection, or a break in the remote monitoring line will cause a fault indication at the remote monitor. Neon indicators are not permitted.
- F. Relay alarm contacts shall be provided for remote alarm monitoring capability of unit status. Surge protected normally open and normally closed contacts shall be provided.
- G. The system shall be equipped with an audible alarm which shall be activated when any one or more of the modules has a reduced protection condition. A mute switch shall be provided for the audible alarm.

- H. The SPD shall provide effective energy surge diversion for application in ANSI/IEEE C62.41-2002 location Category C3 environments. Testing shall be per ANSI/IEEE C62.45-2002 using ANSI/IEEE C62.41 Category C3 waveforms and amplitudes.
- I. A NEMA 4 powder-coated steel enclosure with corrosion-resistant hardware shall be provided for the unit. Unless otherwise noted, SPDs installed within distribution or control equipment enclosures do not require a separate enclosure.
- J. Service entrance devices shall be as manufactured by MCG 200M Series, Square D EMA/IMA Series, Eaton SPD Series, or equal.
- K. SPD shall be suitable for use in Type 2 locations.
- L. Unit shall provide maximum ANSI/UL 1449 VPRs for 240/120-volt, single-phase systems.
 - 1. L-N = 700 V.
 - 2. L-G = 700 V.
 - 3. N-G = 600 V.
 - 4. L-L = 1200 V.
- M. Unit shall provide maximum ANSI/UL 1449 VPRs for 480-volt, three-phase systems.
 - 1. L-G = 2000 V.
 - 2. L-L = 2000 V.

PART 3-EXECUTION

3.01 INSTALLATION

- A. The installation and testing of the system shall be in full accordance with the manufacturer's installation and maintenance instructions and all national and local codes.
- B. Each installed device shall be fed by an appropriately sized circuit breaker, per the manufacturer's installation notes, in the protected panel. No SPD shall be installed without an upstream overcurrent device.
- C. Units shall be installed as close as practical to the electrical panel. Low impedance cabling furnished by the manufacturer shall be utilized for installations with lead lengths greater than, or equal to, 5 feet. Low impedance cabling furnished by the manufacturer or appropriately-sized standard cable, if acceptable to ENGINEER, may be utilized for installations with lead lengths less than 5 feet. SPD leads shall be as short as possible.

END OF SECTION

SECTION 26 51 13

LIGHTING

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes a complete functional lighting system.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. Underwriters Laboratories: Lighting fixtures shall be manufactured in accordance with the standards of the Underwriters Testing Laboratories and shall bear the UL label where practicable. In all cases the lighting fixtures shall be constructed with UL listed components.
- B. Applicable Codes: Fixtures shall be made and installed in accordance with the current version of the National Electrical Code, the Uniform Building Code, the Federal Occupational Safety & Health Act, and other applicable regulations.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.
- D. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material and construction and testing where applicable.
- E. Lighting Standards:
 - 1. LM-79-08 or latest—IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
 - 2. LM-80-08 or latest—IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
 - 3. NEMA SSL 1-2016 or latest—Electronic Drivers for LED Devices, Arrays, or Systems.
- F. Fire Codes: Where necessary to meet Code requirements, enclosure housings shall be constructed to provide a 1-hour fire rating.

1.03 SYSTEM DESCRIPTION

- A. Intent: It is the intent of these specifications to obtain a completed lighting fixture and lighting controls installation by CONTRACTOR. Completed means cleaned, adjusted, tested, and ready for occupancy and operation in accordance with the above-indexed paragraphs and in accordance with the other sections of these Contract Documents. It is the responsibility of CONTRACTOR to point out discrepancies, errors, and other problems.
- B. All lighting fixtures are to be provided complete with all necessary accessories for a proper installation. Catalog numbers shown are basic fixture types, and additional features,

accessories, and options specified, scheduled or required, are to be included for all fixtures provided.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals. Shop drawings shall include, but not be limited to, the following:
 - 1. Manufacturer's dimensioned scale drawings showing in complete detail the fabrication of all lighting fixtures including overall and detail dimensions, finishes, prefinishes, metal thickness, fabrication methods, support method, drivers, type of shielding, reflectors, wiring sizes and insulation types, lenses, and all other information to show compliance with the Contract Documents.
 - 2. Installation instructions.
 - 3. Certified photometric test data and reports.
 - 4. Shop drawings shall not only clearly indicate the assigned fixture type, but also the equipment location.
 - 5. Submittal should include, but not be limited to, wattage, lumen output, color temperature, and CRI value.

1.05 QUALITY ASSURANCE

- A. Standards: Materials, equipment, and parts, as well as workmanship provided under this section, shall conform to the highest commercial standard as specified and as indicated on Drawings. Fixture parts and components not specifically identified or indicated shall use materials most appropriate to their intended use or function and as such be resistant to corrosion and thermal mechanical stresses encountered in the normal application and function of the fixtures.
- B. Measuring and Testing Equipment: CONTRACTOR shall have available at all times, instruments for the measurement of voltage, luminaire temperature, lighting level, and fixture brightness level.
- C. Manufacturers: Firms regularly engaged in the manufacture of lighting fixtures of the types and ratings for the project, whose products have been in satisfactory use in similar service for not less than 5 years.
- D. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Luminaires and lighting equipment shall be delivered to the project complete, including mounting devices, and components necessary for the proper operation of the equipment.
- B. Marking: All equipment must be clearly and boldly identified as to the fixture type and, where practicable, the fixture location.
- C. Timely Purchasing: Luminaires and other appurtenances shall be ordered in a timely fashion and securely stored to be available to meet the project schedule.

1.07 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 LED LUMINAIRES

- A. LED Luminaires shall meet the following technical requirements:
 - 1. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
 - 2. Luminaire efficacy shall match or exceed that of the fixture model numbers shown in the fixture schedule on the Drawings.
 - 3. Luminaire Color Rendering Index (CRI) shall match or exceed that of the fixture model numbers shown in the fixture schedule on the Drawings; a minimum of 80 for interior luminaires and a minimum of 70 for exterior luminaires.
 - 4. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
 - 5. Luminaire lumen output shall match or exceed that of the fixture model numbers shown in the fixture schedule on the Drawings.
 - 6. Wattage shall be equal to that of the fixture model numbers shown in the fixture schedule on the Drawings.
 - 7. Luminaire color temperature shall match that of the fixture model numbers shown in the fixture schedule on the Drawings.
- B. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
- C. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
- D. Lumen output shall not depreciate more than 20% after 10,000 hours of use.

- E. Luminaire and driver shall be provided from a single manufacturer to promote compatibility.
- F. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10%.
- G. Luminaire shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.

2.02 WIRING

- A. All wiring within lighting fixtures or from the splice with the building wiring shall be as specified in Section 26 05 19—Wire.
- B. Wiring within fixture construction shall be concealed, except where the fixture design or mounting dictates otherwise.
- C. Wiring channels and wireways shall be free from projections and rough or sharp edges throughout and all points or edges over which conductors must pass and may be subject to injury or wear.
- D. Insulated bushings shall be installed at points of entrance and exit of flexible wiring.

2.03 LED DRIVERS

- A. General:
 - 1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated in the model numbers in the fixture schedule shown on the Drawings.
 - 2. Driver shall have a minimum rated life of 50,000 hours.
 - 3. Driver shall have a minimum power factor of 0.9 and a maximum crest factor of 1.5 at full input power and across the specified voltage range.
 - 4. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
 - 5. Driver shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
 - 6. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
 - 7. Fuse Protection: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected per Class 2 UL listing.
 - 8. All fixtures located outdoors shall be provided with surge protection.

2.04 MARKING OF FIXTURES

- A. Voltage Identification: Fixtures designed for voltages other than 110- to 125-volt circuits shall be clearly marked.

2.05 FIXTURE TRIMS

- A. Trim Details: Provide trim details as shown on the Drawings or as specified. The trim finish and dimensions are subject to the shop drawing approval of ENGINEER. Mitered corners shall be smoothed before shop finish is applied. No lapping of trim metal for all flush-mounted ceiling trims for rectangular or square recessed fixtures.

2.06 EMERGENCY LIGHTING UNINTERRUPTIBLE POWER SUPPLIES (UPS)

- A. UPS input shall be 120/277 VAC, 60 Hz, three-wire (Switched Hot, Common, Unswitched Hot) plus ground. Input shall be protected by PCB-mounted, fast-acting fuses sized for UPS load.
- B. UPS output shall be 120/277 VAC, 60 Hz, two-wire plus ground, suitable for use with fluorescent, LED, and incandescent fixtures.
- C. UPS battery shall be sealed lead calcium. Battery shall be sized appropriately to provide 90 minutes of run time for 91% of rated output lumens.
- D. Provide sonic audible alarm option.
- E. UPS shall be rated for use in ambient conditions of 68°F to 86°F.
- F. UPS output rating shall be minimum 375 watts.
- G. UPS shall be equipped with self-diagnostic circuitry. Circuitry shall check different operating parameters during initial start-up, normal standby, and diagnostic stages. If a fault is detected, the fault indicator shall flash to alert maintenance personnel.
- H. UPS shall automatically initiate a diagnostic cycle every 28 days to test emergency operation. The self-diagnostic circuitry shall not utilize the lighting load (i.e., the emergency fixture(s)) to cycle and test the unit battery. Instead, a built-in resistive load shall be used, thereby eliminating emergency fixture illumination during diagnostic testing.
- I. UPS shall be capable of providing emergency illumination to switched and unswitched lamps. UPS shall monitor the reference voltage from the line (unswitched) side of the control device. In the event the reference voltage is lost the UPS shall power the emergency fixture(s) regardless of control device position.
- J. UPS shall be capable of being mounted a maximum of 1,000 feet from the emergency fixtures.
- K. UPS shall be UL 924 listed.
- L. Inverter module and battery module shall be housed in a NEMA 1 enclosure.
- M. Three-year warranty on all UPS components shall be included (except batteries).
- N. UPS shall be Isolite Model E3, or equal.

PART 3—EXECUTION

3.01 INSTALLATION

- A. Install fixtures, lenses, etc., after building is enclosed, weathertight, and environmental conditions are nominally the same as expected for the complete spaces. All glassware, reflectors, and refractors shall be clean and free of chips, cracks, and scratches.

- B. All wall-mounted fixtures and all ceiling-mounted surface fixtures including exit lights, shall be fed through a fixture Stud/Hickey/Nipple assembly and with provisions to prevent fixture turning.
- C. All exterior wall-mounted fixtures shown over doorways shall be mounted centered, 6 inches above doorway, unless otherwise noted.
- D. All fixtures shall be securely and adequately supported and installed. Recessed lighting fixtures in suspended ceilings shall have channel and supports provided by CONTRACTOR. Fixture shall be supported from structure and not from ceiling.
- E. Surface-mounted fixtures shall be attached to and supported from structural part of the building in a manner acceptable to ENGINEER. Fixtures shall be supported by not fewer than two supports for each fixture. Where fixtures are to be suspended, they shall be mounted on steel channel with the channel supported directly from the structure by a minimum of 3/8-inch rod inside rigid conduit stems. Any fixture which has an individual fixture weight of greater than 25 pounds shall have safety cable installed, in addition to other support means. Cable shall be 3/16-inch airplane cable. All fittings and connectors shall be compression type. Cables must be secured to the building structure and to a point or points on the fixture to protect against falling parts.
- F. Industrial-type fixtures in unfinished areas which are near obstructions such as ducts and pipes shall be suspended so that the bottom of the fixture is no higher than the bottom of the obstruction. All fixtures in each room shall be located at the height of the lowest fixture, but not lower than 8 feet 0 inch above the finished floor. Fixtures shall not be located until the locations of these obstructions are determined, and fixtures shall be accessible after the installation of other equipment.
- G. Provide inscription for exit signs to conform to codes.
- H. Metal decking shall not be pierced for fixture support.
- I. All fixture whips shall be constructed of minimum No. 12 AWG conductors.

3.02 SUPPORTS

- A. CONTRACTOR Responsibility: CONTRACTOR shall verify all ceiling conditions from the Drawings and provide appropriate mounting accessories for each lighting fixture.
- B. Adequate rigid, sturdy support shall be provided to prevent the possibility of fixture falling. Surface fixtures must be supported with two supports per 4-foot section. Support surface-mounted fixtures from structural members other than ceiling tees by providing Unistrut members spanning main ceiling tees or by mounting directly to structure.

3.03 ADJUSTMENT

- A. Focusing/Adjustment: After the installation of lighting fixtures is completed, fixtures so requiring (both interior and exterior units), shall be adjusted after dark under the observation of OWNER.

3.04 CLEANING

- A. Installation Sequence: Lighting fixture mounting frames, plaster rings, etc., shall be installed prior to the finishing assembly which shall not be installed until the Project is at Final Completion. When the fixture location or construction prevents sequential installation, CONTRACTOR shall carefully protect all reflectors, lenses, flanges, and other visible surfaces.
- B. Cleaning: Before final acceptance by OWNER, all protective (strippable) coatings, dust, finger marks, paint spots, and any other materials deleterious to the appearance or functioning of the lighting fixtures must be removed. Abrasive cleaners are not permitted.

3.05 FINAL INSPECTION

- A. Upon completion of the installation, lighting equipment must be in first-class operating order and free from defects in condition and finish:
 - 1. Fixtures shall be completely clean and free from finger marks, dust, plaster, or paint spots.
 - 2. Any reflectors, lenses, diffusers, side panels, or other parts damaged prior to the final inspection, shall be replaced at no expense to OWNER.
 - 3. Housing shall be rigidly installed and adjusted to a neat flush fit with the ceiling.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: This specification contains the requirements for data cabling, enclosures, termination components, and related subsystems as part of a structured cabling system.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this Section.

1.02 SYSTEM DESCRIPTION

- A. CONTRACTOR shall provide and test all cabling and components necessary for a complete and functional structured cabling system as specified herein and shown on the Drawings. Conduit, raceway, and outlet boxes for the "Information Outlets" shall be provided by CONTRACTOR.
- B. Provide all faceplates, patch panels, equipment racks, equipment trays, and all other items necessary for computer connections at all specified data outlets and patch panel(s).

1.03 REGULATORY REFERENCES

- A. All Work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the National Electrical Code and present manufacturing standards.
- B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- C. The cabling system shall comply with the following standards:
 - 1. ANSI/IEEE C2—National Electrical Safety Code.
 - 2. NFPA 70—National Electrical Code (currently-adopted edition).
 - 3. TIA-568-C.0, TIA-568-C.1, TIA-568-C.2, TIA-568.3-D, TIA-569-B-1, TIA-606-A-1, and TIA J-STD-607-A.
 - 4. IEEE/ANSI 142—Recommended Practice for Grounding of Industrial and Commercial Power Systems.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00—Submittals.
- B. Provide load calculations showing battery runtimes and UPS sizing, including all equipment specified herein.

- C. Provide scaled network cabinet elevation drawings showing all installed equipment.
- D. Record Drawings:
 - 1. Three complete sets of drawings shall be provided by CONTRACTOR prior to final acceptance.
 - 2. These drawings shall contain the following:
 - a. Any changes made to the system during installation.
 - b. Location of all information outlets including jack number identification.
 - c. Scaled network cabinet elevation drawings showing all installed equipment.
- E. Installation Reports:
 - 1. Cable pulling tension reports.
 - 2. Grounding busbar resistance test reports.
 - 3. Copper and fiber-optic cable acceptance test reports.
- F. Technical Manual: CONTRACTOR shall furnish three complete technical service manuals containing the following:
 - 1. Description of maintenance/programming procedures for all equipment and systems.
 - 2. All warranty information required by manufacturers for submission of warranty claims for all equipment installed.
 - 3. All testing reports according to Paragraph 3.03.

1.05 QUALIFICATIONS

- A. CONTRACTOR shall have at least 10 years of experience in the installation of similar systems. CONTRACTOR shall provide documentation upon request to certify that all assigned staff have attended training courses corresponding to the type of cabling and equipment specified herein.
- B. CONTRACTOR shall currently be licensed to install low voltage electronic cabling systems in the state of the project.
- C. CONTRACTOR shall currently meet all manufacturer's requirements for the provision and installation of all equipment specified herein.
- D. CONTRACTOR shall utilize and have technicians trained in the use of the following test equipment: Fiber-optic cable and copper cable certification equipment.

1.06 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with

each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 GENERAL

- A. CONTRACTOR shall provide all necessary power supplies, mounting hardware, and accessories required to install the materials specified herein.

2.02 WALL-MOUNTING BACKBOARD

- A. Provide a 3/4-inch plywood backboard, sized as needed, permanently attached to the wall with flush mounting hardware where shown on the Drawings. Treat the plywood with a nonconductive, fire-resistant coating. Mount the backboard a minimum of 24 inches above the finished floor.

2.03 NETWORK CABINETS

- A. Network equipment shown on the Drawings and specified herein to be provided in a network cabinet shall be installed in a double-hinged, tri-fold rack enclosure suitable for wall mounting. The cabinet shall have a hinged front door with scratch-resistant, tinted, safety-glass window. The cabinet shall be minimum 28 inches wide with integral vertical cable management and 19-inch rack mounting rails per EIA universal spacing. Rack-mounted equipment shall be accessible through the front door and through the hinged tri-fold center section for rear access. Rack spaces above or below each network switch and patch panel shall be provided with horizontal cable management as specified herein. The rear-wall section of the cabinet shall include cable management and conduit entries with knockouts. The hinged center cabinet section shall be able to swing open in either direction. The center cabinet section shall also latch to the rear wall section in two locations and unlatch using hand-operated levers located inside the cabinet.
- B. The front door of the cabinet shall include a keyed lock. Provide minimum two keys to OWNER. Where multiple cabinets are installed, all locks shall be keyed alike.
- C. Provide DIN rail, terminal blocks, wireway, and other devices specified in Section 26 05 19—Wire as required for equipment mounted to the rear-wall section of the cabinet (e.g., camera power supplies, power strip/surge suppressor receptacle, etc.).
- D. The cabinet height shall be sized as required to accommodate all equipment specified herein and shown on the Drawings to be located in the cabinet, plus a minimum of 25% spare rack mounting space.

- E. All non-rack mounted components not requiring regular access shall be mounted to the rear-wall section of the cabinet (e.g., receptacles, power supplies, etc.). Provide blank RU plates and shelves, sized as required, to rack mount equipment that is not provided with rack-mounting flanges (e.g., IP gateway, tone generator, etc.). Non-rack mounted equipment shall be located to avoid conflicts with space reserved for future rack-mounted equipment and shall not be mounted on the floor of the cabinet.
- F. Provide a rack-mounted, true-online UPS backup as specified herein in each cabinet that will allow for continuous operation of all installed equipment for at least 30 minutes. All power connections to UPS shall be plug connected.
- G. Provide rack-mounted power conditioner and distribution units as specified herein in each cabinet. Provide quantity in each rack required to serve the installed equipment.
- H. The cabinet shall be constructed of welded, 14-gauge steel with lightly textured, low-gloss polyester powder paint. The cabinet shall be as manufactured by Hoffman, Model AccessPlus, or equal. Provide two enclosure fan kits Hoffman Model EWMF, or equal, both mounted on one side of the enclosure and directed to positively pressurize the cabinet. Provide washable fan filter kit Hoffman Model AFLTR4LD, or equal, for each fan. Vertical cable management shall be Hoffman Model EWMC24, or equal.

2.04 COPPER CABLE

- A. 300-volt Rated Unshielded Cable:
 - 1. Provide 4-pair, unshielded twisted-pair (UTP) cabling with solid, copper-only conductors meeting EIA/TIA Category 6 requirements for horizontal station cabling. Cable shall be listed as suitable for use in locations indicated on the Drawings. Provide CommScope 2071E Low Smoke PVC, or equal, for Plenum environments, or CommScope 1071E PVC, or equal, for nonplenum environments.
 - 2. Refer to the Execution Section which details the required performance criteria for the permanent link of which the cable is a part. The jacket color for data cables shall be blue.
 - 3. Provide nylon cable ties or reusable hook-and-loop bands, where specified herein, for bundling cables.
 - a. Nylon cable ties for bundling cables above suspended ceilings shall be Panduit Contour-Ty Model CBR, or equal. Provide plenum-rated, natural-color cable ties in plenum environments. Provide black cable ties in all other environments.
 - b. Reusable hook-and-loop bands for all other areas, including equipment racks, shall be Panduit Tak-Ty Model HLT, or equal, black.
- B. Industrial Ethernet Cable (600-Volt Rated Shielded Cable):
 - 1. For communication with plant SCADA Systems and equipment in supervisory control centers, VFD enclosures, switchboards, control panels, etc., over 300 volts, and other areas or raceways with power wiring over 300 volts, provide 600-volt-rated, 4-pair, shielded (F/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568-C.2 standard.
 - 2. Cable conductors shall be minimum 23 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.34 inch. Cable shall be CMR rated, UL listed, 600 V UL AWM rated, and be Belden 7953A or equal.
 - 3. Cable jacket color shall be red.

4. Provide a shielded RJ45 connector on one end of each cable and an unshielded RJ45 connector on the other end of each cable.
- C. Category 6 Ethernet patch cables shall be provided premanufactured by the cable manufacturer or connector manufacturer in sufficient length to connect the associated equipment to any port on the equipment, patch panel, or switch. Field-attached plugs shall be insulation displacement-type and shall be by the same manufacturer as the cable.
- D. Access Control System Cabling–Wiegand Communication Cabling:
1. For access control system devices using Wiegand serial communications, provide 300 volt-rated, 8-conductor, shielded cables suitable for outdoor installation in conduit.
 2. Cable conductors shall be minimum 18 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.320 inches. Cable shall be CM rated, UL listed, and shall be Alpha Wire Model 5388C, or equal.
 3. Cable jacket color shall be gray.

2.05 FIBER OPTIC CABLE

A. Multimode Cables:

1. Provide indoor/outdoor fiber optic cables with fiber counts in each cable as shown on the Drawings. Cable shall be type OFNR and shall be suitable for use inside building and outside plant applications, including duct and conduit installation in accordance with ICEA S-104-696. Installation in building risers shall be in accordance with NEC 770. Cable shall be DX-Series Distribution Riser as manufactured by Optical Cable Corporation, FREEDM One Tight-Buffered Cable Riser as manufactured by Corning, or equal.
2. Individual fibers shall be multimode, 50/125 microns, meeting TIA/EIA 492AAAC and ISO/IEC 11801 type OM3 standards for laser optimized fibers. Primary fiber coating diameter shall be 250 $\mu\text{m} \pm 15$ and the secondary tight buffer coating diameter shall be 900 microns (nominal). All coatings shall be mechanically strippable without damaging the optical fiber. Optical performance shall meet the following requirements:

Wavelength	850 nm	1310 nm
Gigabit Ethernet Distance	1000 m	600 m
10-Gigabit Ethernet Distance	300 m	300 m
Maximum Attenuation	3.0 dB/km	1.0 dB/km

3. Cable shall be all dielectric, tight-buffered, dry water blocking, gel-free, and shall meet UL 1666 and RoHS compliance. The PVC outer sheath shall be flame-retardant and marked with the manufacture's name, date of manufacture, fiber type, flame rating, and sequential length information. Outer jacket shall be black.
4. Connectors shall be provided on all fibers of each fiber optic cable.
5. All cables shall be installed in continuous lengths from endpoint to endpoint. Splices in fiber optic cables shall be allowed only where shown on the Drawings.

B. Fiber-Optic Patch Cables:

1. Fiber-optic patch cables shall be multimode 50/125 microns or, and shall meet UL 1666 (OFNR) flame ratings for standard compliant safety as required by the installation environment. All fiber patch cables shall be pre-terminated and tested for insertion loss. Cable performance shall meet or exceed requirements of the TIA/EIA-568.3-D standard

for OM3 fiber-optic cables. Factory certification test information shall be provided with each cable.

2. Fiber patch cable insulation color shall be aqua for OM3 cables.
3. Fiber connectors shall be LC-type, FOCIS compliant or compatible, and shall exceed the requirements of TIA/EIA-455-21A for 500 mating cycles. The insertion loss for each connector shall not exceed 0.35 dB for multimode cables.
4. Fiber connector and strain-relief color shall be aqua for OM3 cables per the TIA/EIA-568.3-D standard. Strain-relief color shall match connector color.
5. Fiber optic patch cables shall be provided in sufficient length to connect associated equipment to any port on the network equipment.

2.06 CONNECTORS

A. Data Station Cables:

1. Faceplates: CommScope, L-Type flush-mounted, white, or equal, in finished areas and stainless steel, SP-L-Type, flush-mounted, or equal in all other areas.
2. Jacks: CommScope Model MGS400, or equal. Jacks shall be blue.

2.07 PATCH PANELS

A. Copper (RJ-45) patch panels shall be installed where shown on the Drawings and shall be used as a termination point for data jacks shown on the Drawings and specified herein. Patch panels shall have 16 ports, be capable of mounting in a 19-inch rack, and be as manufactured by Panduit, Model CDPP8RG, with grounding kits Model CJSGK-XY, or equal. Each patch panel shall include the following.

1. Universal T568A and T568B jacks for 110-style IDC terminations.
2. UL listing.
3. Ports for typed identification labels.
4. High impact polycarbonate enclosure with grounding kits for each jack.
5. Port module quantities and types (e.g., CAT 6, shielded, unshielded, etc.) shall be as shown on the Drawings and as specified herein as necessary to connect all data jacks shown on the Drawings.
6. Minimum of 25% spare ports available for future terminations.
7. Blank port modules for all unused ports.
8. Provide a grounding bar at patch panel for terminating port grounding kit ground conductors.

2.08 POWER DISTRIBUTION AND GROUNDING

A. Rack-Mounted Uninterruptible Power Supply:

1. The UPS shall be 120-volt AC and true on-line type. UPS batteries shall be sized to provide continuous communication for at least 30 minutes following a power failure.
2. The UPS power shall be provided to all rack-mounted equipment, unless noted otherwise.
3. The UPS shall be plug connected to a line power receptacle and all power connections to the UPS shall be plug connected.
4. Each UPS shall be provided with a relay card that provides a dry contact output to the SCADA System to indicate a common alarm when the UPS batteries need replacement.
5. The UPS and associated batteries shall be located at the bottom of the rack.
6. The UPS shall be APC with relay I/O module, Liebert GXT5 with relay card, or Eaton 9SX. UPS shall be the same make and model as the UPSs being provided by the Section 26 09 00 System Supplier for SCCs.

- B. Rack-Mounted Power Conditioner and Distribution Unit:
 - 1. Provide power conditioner and distribution units in all network cabinets. Provide quantity required to serve the installed equipment. Power conditioners shall be rack mountable and include 8 rear-panel outlets and 1 front-panel outlet with integral 20-amp circuit breaker protection.
 - 2. The power conditioner shall provide voltage regulation, under/over-voltage protection, and transient protection for line-to-neutral and line-to-ground leakage.
 - 3. The power conditioner shall have a front panel-mounted digital voltmeter/ammeter display to indicate RMS line voltage and current.
 - 4. The power conditioner shall be as manufactured by Furman Model PL-PRO DMC, or equal.

PART 3—EXECUTION

3.01 GENERAL

- A. Install all equipment and components in accordance with manufacturer's written instructions, in compliance with NEC, ANSI/TIA/EIA-569-B-1 and with recognized industry practices so that all items comply with these Specifications and serve the intended purposes.
- B. Refer to Section 26 05 53—Electrical Identification for cable and equipment label requirements.
- C. All cabling shall be installed in accordance with good engineering practices as established by the TIA/EIA and the NEC. Cabling shall meet all applicable local, state, and federal building codes. Data cables shall be terminated according to the TIA-568B standard.
- D. Record serial numbers of all items provided that are serialized prior to final acceptance.
- E. All items must be complete as specified prior to final acceptance.
- F. Copper data cables installed between patch panels and data jacks shall be limited to 90 meters to allow for up to 10 meters of combined patch cable length. CONTRACTOR shall identify any cables that cannot be limited to 90 meters and notify ENGINEER prior to installation of any cabling.

3.02 INSTALLATION

- A. Cabling—General:
 - 1. Provide cabling runs from the patch panel to each jack shown on the Drawings. A dedicated cabling run shall be utilized for each jack.
 - 2. Provide faceplates and connections in outlet boxes for all jacks shown on the Drawings.
 - 3. Excess cable behind faceplate connections shall be pulled back into junction boxes in the ceiling space and secured to prevent damage to cabling or connections. Provide minimum 10 feet of slack in all cables within the IT Room and manage slack for future use.
 - 4. Provide grommets and/or bushings in conduit ends to prevent damage to insulation and cables.
 - 5. Use cable tie tool to install cable ties with appropriate pressure to the cable bundles to prevent damage to cables and provide a smooth cut of excess cable tie. Cable ties shall

be able to be turned freely around the bundle of cable. Cable bundles shall be limited to a 3-inch diameter. Cable ties shall be used for cable bundles above suspended ceilings and shall be plenum-rated where required.

6. Use hook-and-loop bands to secure cable bundles within IT Rooms, racks, and network cabinets. Cable bundles shall be limited to a 3-inch diameter.
7. Tighten connectors and terminals including screws and bolts in accordance with the equipment manufacturer's published torque-tightening values for equipment connectors.
8. Allow sufficient slack in cables to prevent premature deterioration of cable system components, and to assist in the maintenance and servicing of cables and/or other building systems and components. Avoid excessive and sharp bends. Manufacturer's recommended pulling tensions shall not be exceeded.
9. Fittings or connections are allowed only at the input and output devices. Splicing is not acceptable in any cable run.
10. All cables shall be installed in conduit.
11. Conduit, raceways, and outlet boxes shall be provided as required.
12. Station cables may be routed free-air only above suspended ceilings. All cables shall be installed parallel to building structure and shall be supported by J-hooks at a minimum of 5 feet intervals.
13. J-hooks and all other cable supports shall be fastened to structural members (beams, concrete decks, etc.). Cables shall not be supported by, or tied to, piping, conduit, suspended ceilings, or other mechanical systems.
14. All copper cables shall be routed and installed to avoid light fixtures and other sources of EMI.
15. All cables shall be concealed within conduit, raceways, or above ceilings. No cables shall be installed where they will be exposed.

B. Fiber Optic Cable Installation:

1. Provide minimum 30 feet of slack in all cables within the wall-mounted pull box in all electrical handholes.
2. Use cable tie tool to install cable ties to manage cable slack. Cable tie tool shall apply appropriate pressure to the cable bundles to prevent damage to cables and provide a smooth cut of excess cable tie. Cable ties shall be able to be turned freely around the bundle of cable. Cable bundles shall be limited to a 3-inch diameter.
3. Use Velcro bands to secure cable bundles within interior pull boxes.
4. Avoid excessive and sharp bends. Manufacturer's recommended bend radius and pulling tensions shall not be exceeded.
5. Fittings or connections are allowed only at the input and output of devices. Splicing is not acceptable in any cable.
6. All cables shall be installed in conduit. Underground installations shall include a 10 AWG, insulated-copper tracer wire. Wire insulation shall be orange and shall be XHHW-2. Wire shall terminate in handholes or junction boxes.
7. A minimum of 15 feet of cable slack shall be provided at end of each fiber optic cable. This slack shall be exclusive of the length of fiber required to accommodate terminations and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored to prevent damage and secure cable in the patch panel or a separate enclosure designated for this purpose. Multiple cables may share a common enclosure. Exact cable termination locations shall be field verified with OWNER and ENGINEER.
8. Fiber optic cables shall be pulled into conduits utilizing a tugger with built-in tension meter. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling

tension. Motorized machines of any other type are not allowed for any fiber optic cable pulling.

9. All spare fibers shall be terminated on spare fiber ports with protective plugs.

C. Grounding:

1. Ground all equipment according to manufacturer's instructions, NEC requirements, EIA/TIA 568B, and EIA/TIA 607.
2. Telecommunications system shall be installed with an isolated grounding system which has only one ground point. That ground point shall be connected to the common grounding electrode via the ground bar in the service-entrance ATS's (SE-ATS-15 or SE-ATS-20). Provide an isolated grounding conductor installed in conduit from the ground bar in service-entrance ATS to the telecommunications grounding busbar (TGB) located in the IT Room. This conductor shall be insulated copper with a minimum conductor size of 6 AWG.
3. Telecommunications Equipment Rack Grounding: Bond the TGB to the ground bar on the equipment racks and cabinets. Use a 6-AWG or larger insulated-copper conductor in conduit from all network cabinets to the TGB.
4. CONTRACTOR shall perform grounding resistance testing on the complete grounding path from the TGB to the service entrance ground. Ground resistance shall not exceed 5 ohms between the TGB and service entrance ground. If the ground resistance test indicates the resistance to be greater than 5 ohms, CONTRACTOR shall provide a larger dedicated, insulated-copper grounding conductor as specified above in conduit from the TGB to the service entrance grounding point.

D. Free-Standing Equipment Racks:

1. Rigidly secure all racks to the floor with manufacturer-approved anchors.
2. Provide a minimum of 20 spare #12-24 cage nuts with screws and 20 spare hook-and-loop bands in each rack storage drawer.
3. Rigidly secure overhead ladder trays to top of rack using ladder tray manufacturer-approved hardware.
4. Align fronts of all racks installed in a multi-rack lineup.

3.03 TESTING AND ACCEPTANCE

A. General:

1. CONTRACTOR is responsible to perform certification tests as indicated below for each subsystem as it is completed.
2. CONTRACTOR is responsible for supplying all equipment and personnel necessary to conduct the certification tests. Prior to testing, CONTRACTOR shall provide a summary of the proposed test plan for each cable type, including equipment to be used, set-up, test frequencies or wavelengths, results format, etc. The method of testing shall be subject to review by ENGINEER.
3. CONTRACTOR shall visually inspect all cabling and termination points to verify that they are complete and conform to the wiring pattern specified herein. CONTRACTOR shall provide ENGINEER with a written certification that this inspection has been made.
4. CONTRACTOR shall conduct certification testing according to a schedule coordinated with OWNER. Representatives of OWNER may be in attendance to witness the test procedures. CONTRACTOR shall provide a minimum of one week advance notice to ENGINEER to allow for such participation. The notification shall include a written description of the proposed tests, including copies of blank test result sheets to be used.

5. Failure to provide the above information shall be grounds for OWNER/ENGINEER to reject any and all Documentation of Results on related testing, and to require a repeat of the affected test.
6. Tests related to connected equipment of others shall only be done with the permission and presence of CONTRACTOR involved. CONTRACTOR shall ascertain that testing only as required to prove the wiring connections are correct.
7. CONTRACTOR shall provide test results and describe the method of the tests, including the date of the tests, the equipment used, and the procedures followed. At the request of ENGINEER, CONTRACTOR shall provide copies of the original test results.
8. All cabling shall be 100% fault-free. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the expense of CONTRACTOR. The applicable tests shall then be repeated.
9. Should it be found by ENGINEER that the materials or any portion thereof provided under this Contract fail to comply with the Specifications and Drawings, with respect or regard to the quality, amount or value of materials, appliances, or labor used in the Work, it shall be rejected and replaced by CONTRACTOR, and all Work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at CONTRACTOR's expense.

B. Copper Data Cabling:

1. Testing shall be from the jack to the patch panel on which the cables are terminated.
2. Cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and compliance with termination standards. Any defective, split or mispositioned pairs must be identified and corrected.
3. In addition to the above, Certification Testing shall be performed on all cables. Testing of the Transmission Performance of station cables (Category 6 and above) shall include the following:
 - a. Length.
 - b. Attenuation.
 - c. Pair to Pair NEXT Loss (new limits).
 - d. PSNEXT Loss.
 - e. Return Loss.
 - f. Pair to Pair ELFEXT Loss (Equal Level Far End Cross talk).
 - g. PSEFEXT Loss.
 - h. Propagation Delay.
 - i. Delay Skew.
 - j. Return Loss.
4. Cables shall be tested to the maximum frequency defined by the standards covering their performance category. Transmission performance testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify "PASS" on each cable and display the specified parameters—comparing test values with standards based "templates" integral to the unit.
5. Testing shall be per ANSI/TIA/EIA 568-C.2 Basic Link test configurations.
6. In order to establish testing baselines, cable samples of known length and of the cable type and lot installed shall be tested. The cable may be terminated with an 8-position Category 6 Modular plug (8-pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be calculated based on this test and be utilized during the testing of the installed cable. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.
7. In the event results of the tests are not satisfactory, CONTRACTOR shall make the necessary adjustments, replacement, and changes, and then repeat the test or tests

which disclosed faulty or defective material, equipment, or installation method, and shall perform additional tests as required by ENGINEER at no additional cost to OWNER.

C. Fiber Optic Cabling:

1. Prior to installation, CONTRACTOR shall perform tests deemed necessary by CONTRACTOR to demonstrate integrity of all fiber optic cables.
2. Upon completion of cable installation and termination, the fiber optic cabling shall be tested to include:
 - a. Optical attenuation using Optical Loss Test Set (OLTS) testing.
 - b. Verification of link integrity using Optical Time Domain Reflectometer (OTDR) testing.
3. OLTS testing shall be performed on all fibers in both directions of transmission after being terminated in the associated permanent patch panels. Measurement shall be inclusive of the optical connectors and couplings installed at the system endpoints, including patch panel terminations. Access jumpers shall be used at both the transmit and receive ends so that an accurate measurement of connector losses is made. Fibers shall be tested in accordance with the IEC 61280-4-1 standard, utilizing 1, 2, or 3 reference cables, as needed.
4. The attenuation measured during OLTS testing shall not exceed the values calculated as follows: $\text{Attenuation (max.)} = 2 \times C + L \times F + S$ dB, where C is the maximum allowable connector loss (in dB), L is the length of the run (in kilometers) and F is the maximum allowable fiber loss (in dB/km). S is the total splice loss (number of splices* max. attenuation per splice). Values referenced herein shall be determined by manufacturer's specifications for approved products.
5. OTDR testing shall be performed in one direction on all fibers after final terminations in permanently-installed patch panels, as well as any fibers planned to remain unterminated. Multimode fibers shall be tested at 850 nm (nominal). The OTDR tests shall incorporate high-resolution optics optimized for viewing of short cable sections. Access jumpers of adequate length to allow viewing of the entire length of the cable, including the connectors at the launch and receive ends shall be used.
6. OTDR traces revealing a point discontinuity in the fiber greater than 0.2 dB in a multimode fiber at any of the tested wavelengths, or any discontinuity showing a reflection at that point shall be a valid basis for rejection of that fiber by OWNER. The installation of that cable shall be reviewed in an effort to remove any external stress that may be causing the fault. If such efforts do not remove the fault, that cable and the associated terminations shall be replaced at CONTRACTOR's expense.

D. Upon completion of the installation, CONTRACTOR shall provide complete test reports to ENGINEER for review. Documentation shall include the following items:

1. Test results submitted in the format specified for submittals under Section 01 33 00–Submittals. Where documentation provided in electronic form requires unique software for viewing test results, CONTRACTOR shall provide one licensed copy of the software along with the above documentation.
2. Insertion loss test data, including a record of test wavelengths, cable type, fiber and cable (or Outlet) i.d., measurement direction, test equipment type, model and serial number, date, reference setup, and crew member name(s).

3. OTDR traces, including individual optical fiber “signatures” obtained as specified above. Trace files shall be named to identify each individual fiber by its location in the cable system and fiber number or color. For OTDR traces, the vertical and horizontal scales shall be set so as to maximize the detail in each backscatter trace. The portion of the trace which depicts the fiber under test shall extend a minimum of 50% of the display area.

END OF SECTION

SECTION 28 10 00

ACCESS CONTROL SYSTEM

PART 1-GENERAL

1.01 SUMMARY

- A. Work Included: This section includes a complete and operational network-based access control system.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SYSTEM DESCRIPTION

- A. The system shall include proximity card readers, controllers, electronic locks, and all other equipment necessary for a complete and operational access control system.
- B. System Supplier shall be defined as the supplier of all system components. This shall include, but not be limited to, all equipment as specified, all required interface hardware, and associated network, hardware, and software configuration.
- C. CONTRACTOR shall be responsible for providing final working drawings based on the information shown on the Drawings and field observations. Contract Documents indicate design intent and do not show all details required for a fully functional system. CONTRACTOR shall make their own determination of equipment to provide, and installation requirements thereof.
- D. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a fully functional installation operating in accordance with these specifications. All responsibility for these systems ultimately lies with CONTRACTOR.
- E. CONTRACTOR shall be responsible for the placing of circuits and making of electrical connections in accordance with the System Supplier-furnished drawings, instructions, and supervision to provide proper connection. CONTRACTOR shall include the services of the System Supplier to supervise making of connections to power supplies, communication circuits, field devices, existing equipment, and any other connections external to the security equipment, to adjust the equipment, initiate and check operation, place the equipment in operation in an acceptable manner, and provide instruction to OWNER's staff on operation and maintenance of the equipment.

1.03 QUALITY ASSURANCE

- A. System Suppliers: Firms regularly engaged in the design and installation of access control systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.
- B. Installer: A firm with at least 10 years of successful installation experience on projects with access control system installation work similar to that required for the Project.

- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. All items of the access control system shall be listed under the appropriate category by Underwriters Laboratories, Inc. (UL) and shall bear the UL label.

1.04 SUBMITTALS

- A. Submit shop drawings and product data sheets in accordance with provisions of Section 01 33 00–Submittals.
- B. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.
- C. Provide battery calculations that indicate device loads due to the various devices and panel components/modules. Battery calculations shall illustrate the minimum battery capacity required and the capacity actually provided.
- D. Provide a complete system wiring diagram including: Point of origin of each circuit, circuit type and labeling, area served by each circuit, wire/cable type and size, locations of panelboards where primary system power is obtained, and the device type and circuit(s) to which the device is connected.
- E. Provide "worst-case" circuit voltage drop calculation.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data in accordance with provisions of Section 01 33 00–Submittals.
- B. Provide battery calculations that indicate device loads due to various devices and panel components/modules. Battery calculations shall illustrate the minimum battery capacity required and the capacity actually provided.
- C. Provide a complete as-built system wiring diagram including: point of origin of each circuit, circuit type and labeling, area served by each circuit, wire/cable type and size, locations of panelboards where primary system power is obtained, the device type circuit(s) to which the device is connected, and location of field devices.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide additional plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions.

1.07 ACCESS CONTROL SYSTEM SUPPLIER AND GENERAL REQUIREMENTS

- A. This specification, along with the Contract Drawings, defines the requirements of a network-based access control system.

- B. It is the intent of this specification to define modifications to an existing fully integrated access control system, tested, delivered to the site, ready to function upon connection of power source and field wiring. Components, peripherals, interconnections, cabling, power supplies, software, and services necessary to form a complete, integrated system shall be identified and provided by CONTRACTOR.
- C. To provide a complete and totally integrated system, a single manufacturer who has experience in furnishing similar access control systems of the same complexity and size shall provide specified equipment and services. The system proposed to meet this specification shall be of field-proven design, incorporating manufacturer's standard equipment and software. Service of all peripheral devices shall be provided by the supplier of the access control system.
- D. Design and specification of devices and completed system shall conform to applicable portions of latest edition of the NEC.
- E. Post start-up support shall include follow-up services such as replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include an allowance of 4 hours for work on site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve operation of the system. In addition to these 4 hours, include one trip to the site.
- F. Base Bid System Supplier shall be Low Voltage Solutions, Inc. (630) 434-9600, no equal.
- G. All components are to be standard make acceptable to OWNER, with one manufacturer to provide all similar components.

1.08 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.09 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L 117-58). CONTRACTOR shall submit, with each shop drawing, step certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawing a letter stating the BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the Specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05, or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 MANUFACTURERS

- A. The access control system hardware and software shall be as manufactured by Open Options, no equal, to match OWNER's existing system. This listed equipment is part of the Base Bid as indicated on the Bid pages and will be considered as establishing the type, function, appearance, and quality required, as defined in the General Conditions.
- B. The Drawings and Specifications were prepared based on Open Options. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes, including engineering changes, to accommodate the other Base Bid equipment including but not limited to structural, mechanical, and electrical work.

2.02 SYSTEM CONTROLLERS AND SOFTWARE

- A. The access control system main controller shall be Open Options SSP-D2, no equal, to match OWNER's existing systems. The main controller shall be installed inside a lockable, wall-mounted access control panel enclosure specified herein and located where shown on the Drawings.
- B. The main controller shall have a 32-bit advanced RISC processor with minimum 2 Gb of total memory and NIST Certified AES 128-bit encryption. The controller shall utilize the distributed door/gate-interface modules specified herein for interface with card readers/keypads, electric door strikes, and fence gate operator.
- C. Provide power supplies as specified herein inside the lockable, wall-mounted access control panel enclosures specified herein as needed to power all system components, including electric door strikes, and to provide a complete and functional system. Coordinate electric door strike voltages with Division 08.
- D. Provide an output extender inside the lockable, wall-mounted access control panel enclosure for the main controller specified herein as needed to generate a dry-contact "Common Fail" alarm for monitoring at the SCADA System. The output extender shall communicate with the main controller over the encrypted RS-485 network and shall have 8 configurable, dry-contact outputs. The output extender shall be LifeSafety Power D8 module, no equal to match OWNER's existing systems.
- E. Provide all system hardware, software, configuration, conduit, and wiring needed for a complete and functional access control system.

2.03 EQUIPMENT ENCLOSURES

- A. Provide lockable, wall-mounted access control panel enclosures in each building where shown on the Drawings as needed to house all access control system modules for each building. The enclosures shall include a factory-provided mounting back panel for equipment mounting. Enclosures shall be LifeSafety Power, no equal, to match OWNER's existing systems. Enclosures shall meet the following requirements:
 - 1. Factory-provided ventilation louvers.
 - 2. Hinged, lockable door.
 - 3. Made from 1 mm steel and painted black inside and out.

4. Enclosure knockouts for conduit entries.
 5. Maximum 24 inches tall by 20 inches wide by 7 inches deep.
- B. Equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.
 - C. Refer to Section 26 05 53—Electrical Identification for the control panel and field wiring color code.
 - D. All wiring within the enclosure shall be through plastic wiring troughs. Plastic wiring troughs shall have removable covers. Maximum fill for wiring troughs shall be 60%. All wiring labels shall be able to be read without removing wiring trough covers. Wiring troughs shall be provided for all field wiring. All wiring shall be labeled at each end with corresponding numbers matching the associated terminal block. This numbering shall be shown on the Submittal and Record Drawings.
 - E. Provide a DIN-rail mounted, 10-amp, 120-volt AC circuit breaker disconnect for the 120-volt AC branch circuit into each enclosure.
 - F. Manufacturer of Accessories:
 1. Plastic wiring duct shall be Panduit Panduct, or equal.
 2. Wire markers shall meet the requirements of Section 26 05 53—Electrical Identification.
 3. Circuit breakers shall be DIN rail-mounted type, Square D, Class 9080, Type GCB-150, or equal.
 4. Surge protective devices: as specified herein.
 5. Power supplies: as specified herein.

2.04 RFID PROXIMITY CARD READER/KEYPAD

- A. The RFID proximity card reader shall have an integral keypad, status-LED band, and shall use encrypted RS-485, Open Supervised Device Protocol, or standard Wiegand communications with the access control panel. The reader shall be suitable for flush-mounted installations in indoor and outdoor locations, and surface-mounted on gooseneck device mounting stands for motorized fence gate control in outdoor locations. The reader shall be powered with 12 volts DC from the access control system door/gate-interface modules specified herein. The reader enclosure shall have an IP65 rating.
- B. Wall-mounted readers shall be HID Signo 40, or equal. Mullion- and door frame-mounted readers shall be HID Signo 20, or equal.

2.05 ELECTRIC STRIKES

- A. Electric strikes shall be provided as specified in Division 08 by the door hardware supplier. CONTRACTOR shall coordinate electric strike operation voltage. All electric strikes shall be wired fail-secure, unless noted otherwise on the Drawings.

2.06 WIRE AND CABLE

- A. Provide all wire and cable required to install all access controls system components as specified herein and shown on the Drawings. Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.

- B. Provide communication cabling as specified in Section 26 05 23—Instrument and Communication Wire and Cable and Section 27 10 00—Structured Cabling. All cables shall comply with equipment manufacturer recommendations for wire and cable.

2.07 SURGE PROTECTION

- A. AC Power Wiring Surge Protective Devices:
 - 1. Provide a 120-volt AC surge protective device on the incoming 120-volt AC branch circuit to each access control panel.
 - 2. Surge protective devices shall be UL 1449 Type 2 SPDs with a 150-volt MCOV rating with the following ratings:
 - a. Minimum 50,000 amps of surge current.
 - b. Minimum 20 amps of continuous current.
 - c. Maximum 600-volt clamping voltage for L-N and L-G protection modes.
 - d. Maximum 1,200-volt clamping voltage for the N-G protection mode.
 - e. Minimum 10,000 amps of nominal discharge current.
 - 3. Surge protection devices shall be Ditek Model DTK-4LVLP, or equal. Provide a 10-year warranty.
- B. DC Power Wiring Surge Protective Devices:
 - 1. Provide a 12-volt DC surge protective device in access control panels for each 12-volt DC circuit to electric door strikes.
 - 2. Surge protective devices shall be UL Listed with an 18-volt MCOV rating with the following ratings:
 - a. Minimum 20,000 amps of surge current.
 - b. Minimum 5 amps of continuous current.
 - c. Maximum 22-volt clamping voltage.
 - d. Minimum 10,000 amps of nominal discharge current.
 - 3. Surge protection devices shall be Ditek Model DTK-DR12B, or equal. Provide a 10-year warranty.
- C. Signal Cabling Surge Protective Devices:
 - 1. Provide a surge protection device inside each access control panel enclosure for each Weigand-communications cable routed out of the access control panel and inside conduit installed in earth. Surge protectors shall be suitable for use with the installed devices and device voltage. Provide all mounting and grounding accessories needed for a complete surge protection system.
 - 2. Surge protection devices shall be UL Listed to UL 497B and shall have the following ratings:
 - a. Minimum 5,000 amps of surge current.
 - b. Minimum 5 amps of continuous current.
 - c. Maximum 22-volt clamping voltage for 12-volt DC circuits.
 - d. Maximum 33-volt clamping voltage for 24-volt DC circuits.
 - 3. Surge protection devices shall be Ditek Model DTK-4LVLP, or equal. Provide a 10-year warranty.

2.08 POWER SUPPLIES

- A. Provide power supplies as needed in each access control panel enclosure to power all associated card readers and electric strikes. Power supplies shall have the following ratings:
 - 1. Input Voltage: 120 volts AC.

2. Output Voltage: 24 volts DC.
 3. Output Current: Minimum 5 amps.
- B. Power supplies shall have an RS-485 interface compatible with the access control system controller for monitoring power supply status at the access control system user interface.
 - C. Power supplies shall be FlexPower Global FPG200, or equal, with capacity as needed for all associated system components.
 - D. Provide battery backup sized as needed to operate all system components for a minimum of 4 continuous hours. Batteries shall be provided in an access control system enclosure.

PART 3-EXECUTION

3.01 SYSTEM OPERATION

- A. System Supplier shall be responsible for the integration of all system components.
- B. System Supplier shall be responsible for all coordination with the Section 32 31 11–Fence Gate Operator manufacturer so that the fence gate operator is controlled by the access control system via a dry-contact output.
- C. Coordinate with OWNER to determine system parameters. System Supplier shall be responsible for all necessary programming.

3.02 INSTALLATION

- A. All system cabling shall be installed in conduit.
- B. Design, layout, size, and plan wire and cable runs as required.
- C. All cables shall be run parallel and perpendicular to building walls and structure.
- D. All wire and cable from the processors to devices at each door shall be “homeruns” unless otherwise specified.
- E. All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.
- F. Avoid splicing conductors. All splices shall be made in junction boxes (except at equipment). Splices shall be made with an approved crimp connection. Wire nuts shall not be used on any low-voltage wiring.
- G. Identify all wire and cable at terminations and at every junction box. Refer to Section 26 05 53–Electrical Identification for additional requirements.
- H. Identify all inputs and outputs on terminal strips with permanent marking labels.
- I. Neatly dress and tie all wiring. The length of conductors within enclosures shall be sufficient to neatly train the conductor to the terminal point with no excess. Run all wire and cable parallel or normal to walls, floors and ground.

- J. Install connectors as required by equipment manufacturers.
- K. Terminations shall be made so that there is no bare conductor at the terminal. The conductor insulation shall bear against the terminal or connector shoulder.
- L. Do not obstruct equipment controls or indicators with wire or cable. Route wire and cable away from heat-producing components.
- M. Provide dedicated 120 VAC access control system circuits for power supplies and controllers. Install power supplies and controllers, provide raceways, boxes, and 24 VDC conductors from supplies to controllers.
- N. All communications cables shall be kept separate from power circuits.
- O. Proximity card readers/keypads shall be mounted in accordance with ADA requirements.

3.03 TESTS AND ADJUSTMENTS

- A. Provide functional testing and adjustments necessary to establish and modify performance of the system as required.

END OF SECTION

SECTION 28 46 00

FIRE ALARM SYSTEM

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes providing all labor, equipment, materials, and performance of all operations associated with the installation of the Fire Alarm System as shown on the Drawings and as specified herein to meet the requirements of a complete Fire Alarm System.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. NFPA 72 National Fire Alarm Code.
- B. NFPA 70 National Electrical Code.
- C. ADA.
- D. Underwriters Laboratories.
- E. NFPA 101 Life Safety Code.
- F. NFPA 90.
- G. International Building Code.
- H. International Fire Code.
- I. International Mechanical Code.

1.03 SCOPE

- A. Provide a complete Fire Alarm System. The system shall be UL listed, cross-listed, and compatible for use with individual zone supervision, individual NAC supervision, and incoming and standby power supervision. The project includes providing a system which includes fire alarm control panels, communicators and antennas, manual stations, smoke detectors, audible/visual devices, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.

1.04 QUALITY ASSURANCE

- A. System Supplier shall be a nationally-recognized company specializing in fire alarm systems. This organization shall employ factory-trained and NICET-certified technicians, and shall maintain a service organization within 100 miles of this project location. The System Supplier and service organization shall have a minimum of 10 years' experience in the fire protective signaling systems industry.

- B. The System Supplier shall provide the final checkout, contractual service, and testing.
- C. The complete installation shall conform to the applicable sections of NFPA-72, NFPA-101 Local Code Requirements and National Electrical Code.
- D. All items of the complete Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer unless the primary equipment provider or manufacturer provides written documentation of compatibility, and assumes responsibility for compatibility with the control equipment.
- E. All items of the complete Fire Alarm System shall be listed under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the UL label.

1.05 MANUFACTURER PROVIDED SERVICES

- A. A manufacturer-trained service technician shall provide the following installation supervision. This technician shall be certified by the equipment manufacturer and shall have a minimum of two years of service experience in the fire alarm industry.
- B. The technician's name shall appear on equipment submittals and a letter of certification from the fire alarm manufacturer shall be sent to ENGINEER. The manufacturer's service technician shall be responsible for the following items:
 - 1. Pre installation visit to the job site to review equipment submittals and verify method by which the system should be wired.
 - 2. Periodic job site visits to verify installation and wiring of system.
 - 3. Upon completion of wiring, final connections shall be made under the supervision of this technician, and final checkout and certification of the system.
 - 4. At the time of final checkout, technician shall give operational instructions to OWNER and/or its representative on the system.
 - 5. All job site visits shall be dated and documented in writing and signed by the Division 26 Contractor. Any discrepancy shall be noted on this document and a copy kept in the system job folder that shall be available to ENGINEER any time during the project.

1.06 QUALIFICATIONS

- A. All equipment shall be supplied by a firm, which specializes in fire alarm and smoke detection systems with a minimum of five years-documented experience. The company shall be an authorized distributor of the proposed equipment.
- B. All work shall be performed by a licensed contractor, who is regularly engaged in the installation and servicing of fire alarm systems.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

- A. Receive equipment at job site; verify applicable components and quantity delivered.
- B. Handle equipment to prevent internal components' damage and breakage, as well as denting and scoring of enclosure finish.
- C. Do not install damaged equipment.

- D. Store equipment in a clean, dry space and protect from dirt, fumes, water, and construction debris and physical damage. Make arrangements with OWNER at the pre-construction conference for storage of equipment on the premises.

1.08 SUBMITTALS

- A. Submit shop drawings and product data sheets in accordance with provisions of Section 01 33 00–Submittals.
- B. Submittals shall be sent to and approved by the authority having jurisdiction prior to submitting to ENGINEER. Include copy of approval letters in submittal to ENGINEER.
- C. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.
- D. Provide a complete site-specific Fire Alarm System plan and riser diagram including: Point of origin of each circuit (usually a Panel, or a Module within a panel), circuit type and labeling, area served by each circuit, wire/cable type and size, locations of panelboards where primary system power is obtained and the device type circuit(s) to which device is connected, and locations of any End-Of-Line Resistor for each field device. Include room name and number for each device.

1.09 RECORD DRAWINGS

- A. Record Drawings shall include the location of all Fire Alarm System devices with their respective labels and the location of all end-of-line device locations.
- B. Upon completion of the work, and final acceptance by the local authority, CONTRACTOR shall submit Record Drawings to OWNER and ENGINEER under the provisions of Division 01.
- C. CONTRACTOR shall submit a copy of the Fire Alarm System; Record of Completion documentation to OWNER, ENGINEER, and authority having jurisdiction. Included with the Record of Completion documentation shall be a copy of final acceptance testing results.
- D. Record Drawings shall be provided to OWNER in electronic PDF format on a USB flash drive, along with the site-specific fire alarm system program.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit Manufacturer data sheets for all equipment installed.
- B. Include operating, installation, and routine maintenance instructions.
- C. Submit a record copy of site-specific computer software for software-based Fire Alarm Systems.
- D. Include manufacturer letter stating the date of installation on which the system is operational.
- E. Operating instructions shall be mounted in a frame next to the FACP.

1.11 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2-PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Fire Alarm System: Provide a complete, supervised, power-limited, fire detection and evacuation system.
- B. System Supervision: The fire protective signaling system shall be an electrically-supervised, power-limited system which shall monitor the integrity of circuit conductors and power supplies. Fire alarm system supplier shall be Low Voltage Solutions, no equal, contact Tony Giese at (815) 693-7470. Fire alarm system shall be remotely supervised by Western Will County Communication Center (WESCOM). CONTRACTOR shall coordinate with WESCOM to establish monitoring of the new fire alarm system. Include the cost of furnishing the monitoring system radio and any WESCOM fees in the Bid.

2.02 ENCLOSURES

- A. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.
- B. Provide cabinets of sufficient size to accommodate the aforementioned equipment.
- C. Cabinet shall be equipped with locks and transparent door panel providing tamperproof enclosure, yet allowing full view of the various lights and controls as required.

2.03 INTELLIGENT FIRE ALARM CONTROL PANEL (FACP)

- A. Intelligent FACP shall be installed where shown on the Drawings.
- B. FACP shall be UL 864 listed, latest edition, manufactured by Autocall, Fire-Lite, Gamewell, Silent Knight, or equal.
- C. The FACP shall allow for loading or editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate facility expansion, building parameter changes, or changes as required by local codes. All software operations shall be stored in a nonvolatile, programmable memory within the FACP. Loss of power shall not erase the instructions stored in memory.
- D. To accommodate and facilitate jobsite changes, initiation circuits shall be individually configurable on-site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a nonlatching circuit, or an alarm verification circuit.

- E. FACP shall be modular, expandable with solid-state, microprocessor-based electronics. It shall display through the front viewing window only those primary controls and displays essential to operation during a fire alarm condition.
- F. The FACP shall meet the following requirements:
 - 1. Support intelligent detection devices.
 - 2. The number of initiating device loops required for the specified quantity of initiating devices, plus one spare loop for each five active loops. Each active loop shall include 5% spare capacity.
 - 3. Printer interface.
 - 4. History log file with a minimum of 1,000 events.
 - 5. Field programmable.
 - 6. Drift compensation.
 - 7. Sensitivity display in percent.
 - 8. Sensitivity adjustment.
 - 9. Day/night sensitivity adjustment.
 - 10. Auto detector test to meet NFPA 72.
 - 11. Alarm verification with tally counter.
 - 12. Silent walk test.
 - 13. Maintenance alerts.
 - 14. AC fail delay.
- G. The FACP shall provide the ability to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history.
- H. The FACP LCD shall have the capability of displaying the following information relative to the abnormal condition of a point in the system prior to acknowledgement:
 - 1. 40 characters for:
 - a. Point address and loop number (e.g., 555-L5).
 - b. Type of device (e.g., smoke, pull station, water flow).
 - c. Point status (e.g., alarm, trouble).
 - 2. 40 characters for: Custom location label (e.g., 4th Floor–Room 444).
- I. FACP keyboards or keypads shall not be required to operate the system during fire alarm conditions.
- J. FACP shall have the following software functions:
 - 1. Setting of time and date.
 - 2. LED testing.
 - 3. Alarm, trouble, and abnormal condition listing.
 - 4. Enabling and disabling of each monitor point separately.
 - 5. Activation and deactivation of each control point separately.
 - 6. Changing operator access levels.
 - 7. Walk Test enable.
 - 8. Running diagnostic functions.
 - 9. Displaying historical logs.
 - 10. Point listing.

- K. FACP shall have the following hardware functions:
1. Acknowledge alarm or trouble.
 2. Silence alarm or trouble.
 3. Reset system after alarm.
 4. Connect/disconnect fire department tie.
 5. Provide manual evacuation (drill).
 6. Supervise system.
 7. Allow computer interface.
- L. FACP shall have the following status indicators and displays:
1. Local audible device shall sound during alarm, trouble, or supervisory conditions. This audible device shall also sound during each key-press to provide an audible feedback when the key has been pressed properly. The visual display shall distinguish between alarm, trouble and supervisory conditions.
 2. The following indicators and displays shall be visible through the front viewing window:
 - a. One red system alarm LED.
 - b. One yellow supervisory service LED.
 - c. One yellow trouble LED.
 - d. Green "power on" LED.
 - e. Liquid crystal display.
 3. The liquid crystal display shall be backlit. It shall not be lit during an AC power failure unless an alarm condition occurs or there is keypad activity.
 4. The following status data shall be available on this display:
 - a. Initiating device circuits.
 - b. Indicating appliance circuits.
 - c. Auxiliary relays.
 - d. Feedback points.
 - e. Primary state of point.
 - f. Zone information.
 - g. Class "A" status.
 - h. Current priority of outputs.
 - i. Disable/Enable status.
 - j. Verification tallies of initiating devices.
 - k. Automatic/Manual control status of output points.
 - l. Acknowledge status.
- M. Controls:
1. The following controls shall be visible through the front viewing window:
 - a. Alarm Acknowledge key.
 - b. Trouble Acknowledge key.
 - c. Alarm Silence key.
 - d. System Reset key.
 2. The following controls shall be accessible with the front door open, though not visible, through the front viewing window:
 - a. Supervising Station disconnect/switch.
 - b. Manual evacuation (drill).
 - c. Key pad for data input and microprocessor control.
- N. FACP shall have the capability of supervising all slave modules LEDs for burnout or disarrangement.

- O. Acknowledgement:
1. All events shall have a global acknowledgement.
 2. Acknowledge one event at a time from an unacknowledged list of events.
 3. After all points have been acknowledged, the LEDs shall glow steadily and the horn shall be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated by an end of list message "END of LIST."
 4. Systems not capable of password-protected manual command operations shall provide key-operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.
 5. All acknowledge functions shall be behind locked door or pass-code protected. In pass-code protection, if the user has insufficient privilege to acknowledge such conditions, a message shall indicate insufficient privilege, but allow the user to view the points without acknowledging them. Should the user have sufficient privilege to acknowledge, a message shall be displayed informing the user that the condition has been acknowledged.
- P. Silencing:
1. If an alarm condition exists and the "Alarm Silence" button is pressed, all alarm signals shall cease operation. The strobes shall remain active until the system is reset.
 2. If trouble conditions exist in the system and the "Trouble Silence" button has been pressed, the audible trouble signal shall cease, but shall resound at time intervals to act as a reminder that the fire alarm system is not in a normal operating mode. Both the time interval and the trouble reminder signal shall be programmable to suit OWNER's application.
 3. Panel shall be equipped with an alarm silence inhibit function.
- Q. Reset:
1. The system reset button shall be used to return the system to its normal state after an alarm condition has been remedied. The display shall step the user through the reset process.
 2. Should an alarm condition continue to exist, the system shall provide indications that resetting cannot be completed and shall remain in an abnormal state. The horn and the Alarm LED shall remain activated. The display shall indicate the total number of alarms and troubles present in the system along with a prompt to use the acknowledge keys to review the points. These points shall not require acknowledgment if they were previously acknowledged.
- R. Access Levels:
1. There shall be multiple access levels. The lowest access level actions shall not require a passcode. Changes to passcodes shall only be made by authorized personnel.
 2. When a correct passcode is entered, the system shall indicate "Access Granted" to the operator. The new access level shall be in effect until the operator manually logs out or the keypad has been inactive for 5 minutes.
 3. Operator entering an invalid code shall be notified with the message "Incorrect Pass-Code" and shall be allowed up to three chances to enter a valid code. After three unsuccessful tries, the message "Access Denied" shall be displayed. The level shall not be altered, and the operator shall no longer be in the menu option.
 4. Access to a level shall allow the operator to perform all actions within that level plus all actions of lower levels but no actions of higher levels.
 5. The following keys/switches shall have access levels associated with them:
 - a. Alarm Silence.

- b. System Reset.
 - c. Set Time/Date.
 - d. Manual Control.
 - e. On/Off/Auto Control.
 - f. Disable/Enable.
 - g. Programming functions.
 - h. Clear Historical Alarm Log.
 - i. Clear Historical Trouble Log.
 - j. Walk Test.
 - k. Change Alarm Verification.
- 6. Acknowledge keys shall also require privileged access to acknowledge points. If the operator presses an acknowledge key with insufficient access, an error message shall be displayed. The points shall scroll with acknowledge key presses to view the points on the list, but the points shall not get acknowledged in the database.
- S. For maintenance purposes, the following lists shall be available from the point lists menu:
 - 1. All points list by address.
 - 2. Monitor point list.
 - 3. Signal/speaker list.
 - 4. Auxiliary control list.
 - 5. Feedback point list.
- T. History Logging:
 - 1. The system shall be capable of logging and storing the last 400 events (alarm and trouble) in a history log. These events shall be stored in a battery-protected random access memory. Each recorded event shall include the time and date of that event's occurrence. Systems not having discrete alarm and trouble logging memory shall include an alternative supervised (e.g., USB drive) historic recording method with battery backup. Real time and date shall accompany all history event recording.
 - 2. History logs shall be capable of being viewed separately or shall be selectable for viewing as a combined history log that displays both alarm and trouble events in chronological order.
 - 3. The following historical alarm log events shall be stored:
 - a. Alarms.
 - b. Alarm Acknowledgment.
 - c. Alarm Silence.
 - d. System Reset.
 - e. Alarm Historical log cleared.
 - 4. The following historical trouble log events shall be stored:
 - a. Trouble conditions.
 - b. Supervisory alarms.
 - c. Trouble acknowledgment.
 - d. Supervisory acknowledgment.
 - e. Alarm Verification tallies.
 - f. Walk Test results.
 - g. Trouble Historical log cleared.
- U. FACP shall have Silent Walk Test Function with History Logging:
 - 1. The system shall be capable of being tested by one person.
 - 2. The panel shall have the capability of dividing the system into distinctive walk test groups, a minimum of 8 groups.

3. Should an alarm condition occur from an active point, not in walk test mode, it shall perform operations described above.
 4. After testing is considered complete, testing data may be retrieved from the system in chronological order to verify device/circuit activation.
- V. Computer Interface:
1. The FACP shall operate as a proprietary local system with the capability of sending status data to and receiving control data from a Central Processing Unit (CPU) at the central reporting stations.
 2. The CPU shall monitor all alarms and troubles and shall control selected functions of each FACP.
 3. The CPU shall supervise all data communication wiring between the CPU and FACP for opens, shorts, and grounds.
- W. Field Programming:
1. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools or PROM programmers and shall not require replacement of memory ICs. All programming may be accomplished through the standard control panel keyboard, or a keyboard at the printer, or the use of a PC. All programs shall be stored in nonvolatile memory.
 2. All programming or reprogramming shall be done by the supplier at no charge until the system is accepted by OWNER.
- X. Terminal/Printer Interface:
1. FACP shall be capable of operating remote monitors and/or printers.
 2. The output shall be ASCII from an EIA RS-232-C connection with an adjustable baud rate.
 3. Each RS-232-C port shall be capable of supporting and supervising up to four remote LCDs and Printers.
 4. Data amplifiers shall be used to increase LCD or printer line distance, if required.
 5. Each RS-232-C port shall only communicate with one keyboard. The FACP shall support up to five RS-232-C ports.
- Y. Intelligent Network:
1. The system shall provide communications with intelligent initiating and control devices individually. These devices shall be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:
 - a. Alarm.
 - b. Trouble.
 - c. Open.
 - d. Short.
 - e. Device missing/failed.
 2. All intelligent devices shall have the capability of being disabled or enabled individually.
 3. There shall be no limit to the number of detectors, stations, or addressable modules which may be activated or "in alarm" simultaneously.
 4. Multiple intelligent devices shall be connected to a single pair of wires. Systems that require factory preprogramming to add or delete devices are unacceptable.
 5. The communication format shall be a completely digital poll/response protocol to allow T-tapping of the circuit wiring. A high degree of communication reliability shall be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

- Z. The FACP shall provide a minimum of 6 amps for notification appliances and auxiliary devices. Provisions shall be available to provide additional signal expansion.

2.04 INTELLIGENT PERIPHERAL DEVICES

- A. All devices shall be supervised for trouble conditions. The system control panel shall be capable of displaying the type of trouble condition (open, short, device missing/failed). Failure of a device shall not hinder the operation of other system devices.

2.05 DEVICE IDENTIFICATION

- A. Each intelligent device shall be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address shall not be acceptable. This address, along with the loop number, shall be indicated and be visible from the ground on the device in the field using machine-generated marking.
- B. Location of the end-of-line (EOL) device shall be indicated on the fire alarm system device containing the EOL device.
- C. Device identification schemes that do not use uniquely set addresses, but rely on electrical position along the communication channel are unacceptable. These systems cannot accommodate T-tapping, and the addition of an intelligent device between existing devices requires reprogramming all existing devices beyond the added device.
- D. The system shall verify that the proper type device is in place and matches the desired software configuration.

2.06 INTELLIGENT DETECTOR BASES

- A. Either the base or the head shall contain electronic circuits that communicate the detector's status (normal, alarm, sensitivity status, trouble, etc.) to the control panel over two wires. The same two wires shall also provide power to the base and detector.
- B. The base shall be lockable. The locking feature shall be field-removable when not required.
- C. Upon removal of the detector's head, a trouble signal shall be transmitted to the control panel.
- D. The detector base shall be sealed against rear airflow entry.
- E. Each detector's base or head shall contain LED(s) which shall flash when the detector is being scanned by the control panel. The LED(s) shall turn on steady when the detector is in an alarm condition.
- F. Each base shall provide means to allow for function testing of the detector at the detector's location.
- G. The base shall be common with heat detector and smoke-type detectors and shall be compatible with other intelligent detectors, addressable manual stations, and addressable modules on the same circuit.

- H. The detectors shall be plugin units which mount to a common base, and shall be UL 268 approved.
- I. The detector shall be a 24 VDC type, which is compatible with the fire alarm panel and obtains its operating power from the supervisory current in the fire alarm detection loop. The 24 VDC detector shall be reset by actuating the control panel reset switch.
- J. To minimize false alarms, voltage and RF transient suppression techniques shall be employed.
- K. Detectors shall be installed on circuits with alarm verification modules.

2.07 INTELLIGENT PHOTOELECTRIC SMOKE DETECTORS

- A. The detectors shall contain no radioactive material.
- B. Detectors shall be of the solid-state photoelectric type and shall operate on the light-scattering photodiode principle using a pulsed infrared LED light.
- C. Smoke detectors shall be listed for sensitivity testing from the control panel. Sensitivity test results shall be logged.
- D. Smoke detectors shall communicate the actual smoke chamber values to the system control panel.
- E. Smoke detectors shall be smoke density measuring devices having no self-contained alarm setpoint (fixed threshold). The alarm decision for each detector shall be determined by the control panel. The control panel shall determine the condition of each detector by comparing the detector's value to the stored value.

2.08 PULL STATIONS

- A. Pull stations shall contain circuits that communicate the station's status (alarm, normal) to the control panel over two wires, which also provide power to the pull station. The address shall be field programmable at the station.
- B. Manual stations shall be double-action, constructed of high-impact red Lexan with raised white lettering, and a smooth high-gloss finish.
- C. Station shall mechanically latch upon operation and remain so until manually reset by a master key common to all system locks. Stations which use Allen wrenches or special tools to reset are not acceptable.
- D. The manual station shall be fitted with screw terminals for field wire attachment.

2.09 ADDRESSABLE INTERFACE MODULES—GENERAL

- A. Addressable Interface Modules shall receive their 24 VDC power from a separate two-wire circuit provided by an appropriate power supply.
- B. The module shall be available in either a Class B or Class A supervision version.

- C. In the Class B version, the wiring shall be supervised by an end-of-line device.
- D. In the Class A version, the wiring shall be looped back and connected to the module to allow continual operation of the controlled devices even if the wiring sustains a single break.
- E. The interface modules shall be supervised and uniquely identified by the control panel. Device identification shall be transmitted to the control panel for processing according to the program instructions.
- F. Should the interface modules become nonoperational, tampered with, or removed, a discrete trouble signal unique to the device shall be transmitted to and annunciated at the control panel.
- G. The interface modules shall be capable of being programmed for its "address" location on the intelligent device initiating circuit. The interface modules shall be compatible with addressable manual stations and intelligent detectors on the same intelligent initiating circuit.

2.10 ADDRESSABLE INTERFACE MODULES—SUPERVISED CONTROL

- A. Interface modules shall be suited for control of indicating appliances and HVAC equipment.
- B. For signals and other device control with Class B or Class A wiring supervision, the interface module shall provide double-pole/double-throw relay switching that can be used to connect any of the following through easily replaceable 2-amp fuses:
 - 1. A zone of signals to a power source.
 - 2. Speakers to an audio source.
 - 3. Firefighter phone jacks to a communications channel.
 - 4. A variety of controlled devices to the appropriate controlling circuits.
- C. These interface modules shall communicate the supervised wiring status (normal, trouble) to the fire alarm control panel and shall receive from the fire alarm control panel a command to transfer the relay.

2.11 FAULT ISOLATOR MODULE

- A. The system shall have a Fault Isolator Module (FIM) on the initiating device circuits in the following situations:
 - 1. Loop extends to another floor.
 - 2. Loop extends to another building.
 - 3. Loop has more than 25 devices.
- B. Isolated Loop Circuit Protectors (ILCP) shall be located as close as practical to the point where these conditions occur.
- C. FIM shall automatically reconnect the isolated section of the loop upon correction of the fault conditions. The FIM shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an FIM after its normal operation.
- D. FIM shall include an LED, which shall flash under normal operation and illuminate steady to indicate a short circuit.

2.12 HORN/STROBE UNITS

- A. Horns shall have Lexan housing with field-adjustable output taps, three taps minimum. Sound pressure level output shall be 87 dB at 10 feet. Horns shall have vandal-resistant Lexan grills and sealed backs to protect the phenolic impregnated cone.
- B. The unit shall be complete with a tamper-resistant Lexan lens with "FIRE" lettering visible from a 180-degree field of view. Strobes installed in open areas such as hallways, open office spaces, and assembly areas shall have an adjustable candela rating range from 15-75 candela. Strobes installed in mechanical areas shall have a peak candela rating of 110 candela. All strobes shall be in compliance with ADA requirements.
- C. Strobe devices installed in NEMA 4X areas shall be installed in a clear Lexan enclosure. Enclosure shall be Model STI-1229 as manufactured by Safety Technology International Inc., or equal.
- D. Horn devices installed in NEMA 4X areas shall be rated at 110 dBA at 10 feet. Horn device shall be model 304GCX as manufactured by Federal Signal Corporation. Horn device shall be powered through the FAS. Provide addressable relay modules and supervisory relays to activate this device from the FACP.
- E. A common horn/strobe device installed in NEMA 4X areas manufactured by System Sensor, SpectrAlert P2RK, or equal.

PART 3—EXECUTION

3.01 INSTALLATION

- A. The complete installation shall be done in a neat, workmanlike manner in accordance with the applicable requirements of NFPA 70 and the manufacturer's recommendations.
- B. If field conditions require, cover all smoke detection devices with plastic bags immediately after installation to maintain cleanliness.

3.02 FIRE ALARM SYSTEM CONFIGURATION

- A. The FACP in the Office shall function as the main panel for the entire site. All alarms and supervisory messages for the entire site shall be annunciated through this panel. Notification of alarms to off-site monitoring agency shall be through this panel.

3.03 FIRE ALARM SYSTEM OPERATION

- A. FACP:
 - 1. Under normal condition, the front panel shall display a system status message with current time and date.
 - 2. Should an abnormal condition be detected, the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steadily for trouble and supervisory conditions.
 - 3. In the event of an abnormal condition, the following three characteristics relative to the condition shall be displayed simultaneously in alphanumeric format:
 - a. Custom location label (40 characters minimum).

- b. Type of device (e.g., smoke, heat, pull station).
 - c. Status (e.g., alarm, trouble).
- 4. Pressing the appropriate acknowledge button shall acknowledge the alarm or trouble condition.
- 5. After all points in alarm have been acknowledged, associated LEDs shall glow steady and the panel audible signal shall be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated.
- 6. Alarm Silencing:
 - a. Pressing the "Alarm Silence" button shall cause all notification appliances programmed for "On-Until-Silenced" to be deactivated. A separate panel-mounted yellow LED shall illuminate to indicate the alarm silenced mode.
 - b. All NACs programmed for "On-Until-Reset" shall remain activated until the system is reset.
- 7. System Reset:
 - a. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied.
 - b. In the event an alarm condition continues to exist following system reset, the system shall remain in an abnormal state. System control relays shall not reset. The panel audible signal and the Alarm LED shall remain on. The display shall indicate the total number of alarms and troubles present in the system along with a prompting to review the points. These points shall not require acknowledgment if they were previously acknowledged.
 - c. In the event the alarm silence inhibit function is active, the system shall ignore all key presses. An indication of enabling and disabling the inhibit stator shall be provided as a feedback to the operation.
- 8. Walk Test System Testing:
 - a. While in the test mode, the system shall display a trouble condition.
 - (1) While in the walk test mode, the activation of an initiating device shall be silently logged as an alarm in the historical log. The panel shall automatically reset after logging the alarm.
 - (2) The momentary disconnection of an initiating device or notification appliance shall be silently logged as a trouble condition in the historical log. The panel shall automatically reset itself after logging of the trouble condition.
 - (3) Integrity of the installation conductors of IDCs and NACs shall be verified by momentarily opening any circuit.
 - (4) Walk Test of ground fault circuit testing shall be verified by operating the Notification Appliances for 4 seconds.
 - b. The Walk Test sequence shall have the capability of activating NACs to signal with a code associated with the alarmed zone. Any momentary opening of initiating or NAC wiring shall cause the notification appliances to sound for 4 seconds to indicate the trouble condition. The Walk Test feature shall automatically revert to the normal operating mode after 8 hours if it is not manually activated.
- 9. LED Supervision: All slave module LEDs shall be supervised for burnout or disarrangement. Should a problem occur, the panel shall display the module and the LED location numbers to facilitate location of that LED.
- 10. Active Status Reminder: Should any alarm, supervisory, or trouble condition be present within the system and the audible signal silenced, the local tone alert shall resound every 8 hours as a reminder that the fire alarm system is not 100% operational.

B. Smoke Detection Operation:

1. The activation of any system smoke detector shall initiate an alarm verification operation whereby the FACP shall reset the activated detector and wait for a second alarm activation. If after 20 seconds and within 1 minute after resetting a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within 1 minute, the system shall resume normal operation. The alarm verification shall operate only on single smoke detector alarm. Other activated initiating devices or multiple smoke detector alarms shall be processed and reported immediately. The alarm verification operation shall be selectable by device or zone.
2. The intelligent system shall have the capability of displaying the number of times (tally) a detector has gone into a verification mode.
3. The FACP shall maintain a moving average of the detector's smoke chamber value to automatically compensate (move the threshold) for dust and dirty conditions that could affect detection operations. The system shall automatically maintain a constant smoke obscuration sensitivity for each detector (via the floating threshold) by compensating for environmental factors. Photoelectric detector's smoke obscuration sensitivity shall be adjustable to within 0.3% of either limit of the UL window (0.5% to 4.0%) to compensate for any environment.
4. The system shall automatically indicate when an individual detector needs cleaning. When a detector's average value reaches a predetermined level, a trouble message shall be audibly and visibly indicated at the FACP for the individual detector. Additionally, the LED on the detector base shall glow steady giving a visible indication at the detector's location. If the trouble condition is left unattended and the detector's average value increases to a second predetermined value, another trouble message shall be indicated at the FACP for the individual detector. To prevent false alarms, these trouble conditions shall in no way decrease the amount of smoke obscuration necessary for system activation. For scheduling of maintenance, the control panel shall be able to generate a message indication for any detector approaching a trouble condition because of dirt or contamination.

3.04 ALARM SEQUENCE

- A. The system alarm operation subsequent to the alarm activation of any manual station or automatic detection device shall be as follows:
1. All audible alarm notification appliances shall sound with the following characteristics: Temporal code pattern until silenced by the alarm silence switch at the FACP.
 2. All visible alarm notification appliances: Strobes shall display a continuous (synchronized where indicated on the Drawings) pattern until system is reset. Strobe intensities are indicated on the Drawings for adherence with ADA.
 3. Alarm horns and strobes shall be wired and operate independently.
 4. A supervised signal to notify the central station is to be activated.
- B. The FACP shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.
- C. Activation of an auxiliary bypass means shall override the automatic functions either selectively or throughout the system.
- D. The system shall have an alarm list means that shall allow the operator to display all alarms, troubles, and supervisory service conditions with the time of occurrence. This shall allow for

the determination of the most recent alarm and may also indicate the path that the fire is taking.

3.05 POWER REQUIREMENTS

- A. The FACP shall receive 120 VAC (as noted on the Drawings) from a dedicated circuit. This branch circuit shall have a “breaker lock” to prevent accidentally deenergizing of the power to the fire alarm panel. Circuit breakers shall be red and labeled “FIRE ALARM.”
- B. The FACP shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC main’s power in a normal supervisory mode for a period of 24 hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
- C. The FACP shall include a disconnect switch for the AC power inside an enclosure near the panel or within the panel itself. This switch shall be labeled “Fire Alarm Power Disconnect.”
- D. Isolated Loop Circuit Protectors (ILCP):
 - 1. The FACP shall include Isolated Loop Circuit Protector (ILCP) on all circuits which extends beyond the building. These circuits include, but are not limited to, the initiating device circuits, alarm notification appliance circuits, and signaling line circuits. ILCP shall be located as close as practical to the point where the circuits leave or enter a building.
 - 2. The ILCP grounding conductor shall be a No. 12 AWG wire having a maximum length of 25 feet. It shall be run in a straight line and connected to the building grounding electrode system.
 - 3. The ILCP shall have a line-to-line response time of less than one nanosecond. Spark gap devices or devices incorporated in or installed within the control panel in lieu of the ILCP are not acceptable.

3.06 SUPERVISION

- A. The system shall contain independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.
- B. There shall be supervisory service initiation device circuits for connection of all sprinkler flow and tamper switches. Device activation shall be appropriately annunciated at the FACP.
- C. Auxiliary manual controls shall be supervised so that an “off normal” position of any switch shall cause an “off normal” system trouble.
- D. Auxiliary circuits for addressable relays shall be supervised so that a blown fuse or an open in the circuit shall be visibly and audibly annunciated.
- E. Each independently supervised circuit shall include a discrete visible amber “Trouble” LED to indicate disarrangement conditions per circuit.
- F. The incoming power to the system shall be supervised so that any power failure shall be audibly and visually indicated at the control panel. A green “power on” LED shall be displayed continuously while incoming power is present.

- G. The system's batteries shall be supervised so that a low battery condition or disconnection of any battery shall be audibly and visually indicated at the control panel.
- H. The system modules shall be electrically supervised for module placement. Should a module become disconnected, the system trouble indicator shall illuminate and the audible trouble signal shall sound.
- I. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

3.07 RACEWAYS

- A. All wiring shall be in a conduit system separate from all other building wiring. Conduit and boxes shall be painted red. See Section 26 05 33—Conduit for specifications.
- B. All wiring shall be installed in minimum 3/4-inch conduit.
- C. Surface access to existing alarm initiating circuits in public areas shall be via UL listed surface metal raceways (minimum equivalent to 3/4-inch conduit) and box extensions.
- D. There shall be no sharp edges with installed materials.

3.08 CONDUCTORS

- A. All cable shall be installed according to NEC Article 760.
- B. All cables and wires shall be No. 14 AWG and larger and shall be stranded.
- C. All initiation and notification circuit cabling shall be listed Type FPL.
- D. All wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, disarrangement of any components, any open circuits or grounds in the system, an audible and visual trouble signal shall be activated until the system is restored to normal.
- E. All conductors shall be color-coded. Coding shall be consistent throughout the facility. Green wire shall be used only for equipment ground.
- F. FACP and NAC panels shall be connected to separate dedicated branch circuit from the building emergency panel, maximum 20 amperes. Circuit breaker shall be red and labeled as "FIRE ALARM."
- G. Power wiring for FACP shall be No. 12 AWG.
- H. FACP shall have No. 12 AWG green equipment ground wire. Where fire alarm circuits enter or leave a building, additional transient 75 to 90-volt gas tube protection shall be provided for each conductor.
- I. Leave 8-inch wire tails at each device box and 36-inch wire tails at the FACP.

- J. Cable for intelligent detector loops shall be 18 to 12 AWG twisted pair with a shield jacket installed in 3/4-inch conduit. Shield continuity shall be maintained and connected to earth ground only at the control panel. Intelligent detector wiring shall not be in the same conduit with 120/240 VAC power wiring or other high current circuits. T-taps or branch circuit connections are allowed for all class B intelligent loop circuits.
- K. Wiring of alarm horn circuits and alarm strobe circuits shall be No. 14 AWG minimum.
- L. Fire alarm cables shall be held in place at the device box by means of a two-screw connector (do not use squeeze- or crimp-type connectors).
- M. All splices or connections shall be made within approved junction boxes and with approved fittings. Boxes shall be red and/or labeled "FIRE ALARM SYSTEM" by decal or other approved markings.
- N. Tray cable is not acceptable for use as fire alarm systems wiring.

3.09 DEVICE MOUNTING

- A. Unless otherwise noted on the Drawings, the recommended mounting heights and requirements are as follows:
 - 1. FACP: Mount control panels so all visual indicators and controls are at 60 inches above floor level. Cabinet shall be grounded to either a cold water pipe or grounding rod.
 - 2. Audio-Visual Devices:
 - a. Install flush, semiflush, or surface mount at 6 inches below finished ceiling or at 80 inches from the bottom of the device to the highest level of the finished floor. No devices protruding 4 inches or more shall be installed lower than 80 inches.
 - b. All audio/visual devices shall be installed at the same height throughout the facility.
 - c. For surface mounting, use manufacturer-supplied back boxes and trim plates. Mark each device with its circuit number.
 - 3. Manual Stations:
 - a. The operable part of the manual stations shall be installed not less than 3 1/2 feet (42 inches) and not more than 4 feet (48 inches) above finished floor. All Manual Stations shall be in unobstructed locations. Mark the unit's address on the inside and outside of housing. For surface mounting, use manufacturer-supplied backboxes and trim plates
 - b. All pull stations shall be installed at the same height throughout the facility.
 - 4. Smoke Detectors:
 - a. The location of detectors shown on the Drawings is schematic only. The detectors shall be located according to code requirements.
 - b. Surface mounted detectors shall be installed using backboxes equal to the base's size. Standard octagon and square boxes are not acceptable.
 - c. Detectors shall be located on the highest part of a smooth ceiling so that the edge of the detector is no closer than 4 inches from a sidewall. Ceilings with beams, joists, or soffits that exceed 8 inches in depth require special planning and closer spacing.
 - d. If it is necessary to mount a detector upon a sidewall, the top of the detector shall be located no closer than 4 inches from the ceiling and no further away than 12 inches.
 - e. Smoke detectors shall be installed to favor the air flow towards return openings and not located closer than 3 feet from air supply diffusers which could dilute smoke before it reaches the detector. No detectors shall be installed in direct airflow.

- f. Smoke detectors shall be located near the center of the open area which they are protecting, thus providing coverage generally for 15-foot radius for smoke detectors and a 25-foot radius for heat detectors.
- g. Mark the address and loop number on each detector's base.

3.10 FIELD START-UP AND COMMISSIONING

- A. Provide the services of a manufacturer's qualified NICET-certified technician to assist CONTRACTOR in installation and start-up of the equipment specified in this section. The manufacturer's representative shall provide technical direction and assistance to CONTRACTOR in general operation of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The manufacturer's representative shall provide inspection of the final installation. The manufacturer's representative shall perform site start-up and functional checkout of the equipment. Upon completion of the manufacturer's start-up and checkout, the manufacturer shall generate a site start-up and functional checkout report, documenting all systems checked as well as any incomplete work remaining and operational deficiencies. CONTRACTOR shall provide three copies of the manufacturer's site start-up and functional checkout report to ENGINEER for review.
- C. CONTRACTOR shall be responsible for all costs required to check operation of the system.
- D. The completed fire alarm system shall be fully tested by the manufacturer in accordance with all applicable local codes in the presence of OWNER's representative and the local Fire Marshal. Upon completion of a successful test, a certification shall be issued in writing to OWNER and CONTRACTOR.
- E. CONTRACTOR shall provide a fire alarm control panel that is communicating properly between the FACP and the monitoring agency.

3.11 TRAINING

- A. Upon successful completion of checkout by ENGINEER, a manufacturer's representative shall provide a demonstration of the automated sequences of operation. After this demonstration and acceptance by OWNER, the manufacturer shall provide 4 hours of "hands-on" training for OWNER's operating personnel which shall cover the following topics:
 - 1. Overall System Description and Theory of Operation.
 - 2. Automatic Operation.
 - 3. Manual Operation and Testing of System Devices.
 - 4. Recommended System Check Lists and Log Sheets.
 - 5. Recommended Preventative Maintenance.
- B. One 4-hour training session for two operators shall be provided. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, controls, protective devices, and other major components. Travel time and expenses to the jobsite shall be over and above the time required to perform the training and shall be included in the Bid.

3.12 IDENTIFICATION

- A. Provide fire alarm circuit conductors with color-coded insulation or other permanent identification at each conductor termination and in each junction box. All fire alarm wiring shall be in conduit.
- B. All junction boxes shall be painted red and labeled "Fire Alarm."

END OF SECTION

SECTION 31 10 00
CLEARING AND GRUBBING

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Cutting and disposing of trees, brush, windfalls, logs, and other vegetation.
 - 2. Removing and disposing of roots, stumps, stubs, logs, and other timber.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. Payment: Payment for clearing and grubbing will be at the Unit Price Bid. Tree protection shall be incidental to area work.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 PREPARATION

- A. CONTRACTOR shall identify existing plant life to remain and shall tag accordingly.

3.02 PROTECTION

- A. CONTRACTOR shall protect from damage utilities and structures that are to remain.
- B. CONTRACTOR shall protect trees, plant growth, and features designated to remain as final landscaping.
- C. See Division 01 for protection of survey monumentation.

3.03 CLEARING AND GRUBBING

- A. Clearing and grubbing shall consist of cutting and disposing of trees, brush, windfalls, logs, and other vegetation, and the removing and disposing of roots, stumps, stubs, grubs, logs, and other timber from within the clearing limits as defined on the Drawings, designated to be removed on the Drawings or in the Specifications, or fall within the excavation, embankment, or improved areas of the site.
- B. All roots and stumps shall be removed to a depth of not less than 12 inches below the original ground surface in embankment areas. In cut areas, such material shall be removed to a depth of not less than 12 inches below the subgrade.

- C. Disposal by burning or burying clearing and grubbing items within the project limits is not allowed.

END OF SECTION

SECTION 31 23 00

EXCAVATION, FILL, BACKFILL, AND GRADING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: Excavating, filling, backfilling, and grading for this work includes, but is not necessarily limited to:
 - 1. Excavating for footings, foundations, roads, utilities, sidewalks, driveways, parking lots, restoration, and miscellaneous areas.
 - 2. Furnishing and placing all fill and backfill.
 - 3. Provide compaction of all fill and backfill.
 - 4. Furnishing and placing vapor barrier and granular cushion below interior slabs on grade.
 - 5. Furnishing and placing of crushed stone mat below tank slabs and manhole/vault slabs, basement floors, or other structures where required.
 - 6. Rough and finish grading prior to paving, seeding, etc.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. Allowances:
 - 1. CONTRACTOR shall INCLUDE in the Bid the cost of replacing 100 cubic yards of unsuitable foundation material for structures and roads as defined in this section. The unit price shall include the cost of dewatering and slope stabilization and other incidental items associated with this work. Payment to CONTRACTOR for unsuitable foundation material for structures and roads will be adjusted, add or deduct, based upon the actual unsuitable material excavated (more or less than 100 cubic yards) and the unit price for replacing unsuitable foundation material. Volume shall be as measured in the ground. Extra payment will not be made for specified undercutting and filling or gravel bedding material required for placing concrete above water level as required under the concrete specifications. The Bid shall include any removal and replacement of excavated material so indicated on the Drawings or specified herein.
 - 2. CONTRACTOR shall INCLUDE in the Bid the cost of replacing 100 cubic yards of unsuitable foundation material for utility trenches as defined in this section. The unit price shall include the cost of dewatering and slope stabilization and other incidental items associated with this work. Payment to CONTRACTOR for unsuitable foundation material for utility trenches will be adjusted, add or deduct, based upon the actual unsuitable material excavated (more or less than 100 cubic yards) and the unit price for replacing unsuitable foundation material. Volume shall be as measured in the ground. Extra payment will not be made for specified undercutting, filling, or bedding. The Bid shall include any removal and replacement of excavated material so indicated on the Drawings or specified herein.
- D. Payment:
 - 1. Common excavation shall include all excavation specified, undercutting, fill, backfill and grading, including rock excavation but not including unsuitable foundation material, as hereinafter described.

2. All common excavation shall be included in the Lump Sum Bid. Changes which require additions to or deductions from the excavation will be adjusted on the basis of the unit price for changes contained in the Contract.

1.02 REFERENCED STANDARDS

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications.
- B. ASTM C33—Standard Specification for Concrete Aggregates.
- C. ASTM D698—Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- D. ASTM D1557—Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

1.03 SUBMITTALS

- A. Submit sources and gradations for materials proposed for use as compacted fill, utility trench backfill, trench bedding and cover material, crushed stone mat, and granular cushion.
- B. Submit samples of materials proposed for use in Paragraph 1.03.A to a soils testing laboratory for analysis of its suitability and for recommendations on moisture content during compaction, compaction methods, or other appropriate information.
- C. Submit sufficient samples of each different type or classification of soil to obtain representative values.

1.04 JOB CONDITIONS

- A. The elevations shown for existing work and ground are reasonably correct, but are not guaranteed to be absolutely accurate. No extras will be allowed because of variations between drawings and actual grades.
- B. Soil borings were made and the soils information is included in an appendix to these Specifications. The information contained is not guaranteed to be indicative of conditions to be encountered during construction. It is CONTRACTOR's responsibility to make its own investigations to determine physical conditions at the site, which may affect the work.

PART 2—PRODUCTS

2.01 COMPACTED FILL

- A. All fill and backfill material designated to be compacted fill shall be granular with no stones larger than 4 inches and shall be reasonably well-graded throughout the particle size range. A minimum 65% of the material shall pass the 3/4-inch sieve, and the material shall be capable of being compaction tested in accordance with ASTM D1557 and D698, as

determined by the Testing Firm. Of that portion of the material passing the No. 4 sieve, not more than 25% shall pass the No. 200 sieve, and material shall have less than 5% clay content. When placing fill during wet weather or in wet areas, this requirement shall be modified to not more than 5% passing the No. 200 sieve. Adequately dewatered areas are not defined as wet areas.

- B. Native material may be used as compacted fill if it meets the above specification. CONTRACTOR shall determine whether native material meets the above specification. CONTRACTOR shall provide all needed fill material whether from on-site or off-site at no additional cost to OWNER.

2.02 CRUSHED STONE MAT

- A. Crushed stone mat below tank slabs, manholes, vault slabs and basement floors shall be 3/4-inch clear crushed stone and shall meet all requirements of Illinois DOT Article 351, gradation CA7/11.

2.03 GRANULAR CUSHION

- A. Granular cushion beneath floor slabs-on-grade shall meet requirements of Illinois DOT Article 351, gradation CA6.

2.04 EMBANKMENT FILL

- A. Embankment fill shall contain no stumps, brush, rubbish, or other perishable material. The top 12 inches of the earth embankment shall be earthy material free from large stones.

2.05 CONCRETE FILL

- A. Concrete fill shall be Class X concrete as defined Section 03 30 00—Cast-In-Place Concrete or flowable fill as defined in this section.

2.06 CLAY FILL

- A. Clay fill shall contain at least 25% clay minerals (material finer than 0.002 mm).

2.07 FLOWABLE FILL

- A. Flowable fill shall be a self-compacting, self-leveling, material consisting of a mixture of fine aggregate and filler (as needed), water, and cementitious materials (Portland cement, fly ash, granulated blast furnace slag) that is in a flowable state at the time of placement meeting the requirements of the National Ready Mixed Concrete Association Guide Specification for Controlled Low Strength Materials (CLSM). The flowable fill shall be proportioned by the ready mixed concrete supplier on the basis of field experience and/or laboratory trial mixtures to produce a cohesive and nonsegregating mixture which has the following properties:
 - 1. Minimum compressive strength: 50 psi.
 - 2. Maximum compressive strength: 150 psi.
- B. CONTRACTOR shall submit the following information well in advance of fill placement to avoid any delay in construction:

1. Gradation of fine aggregate.
2. Design mix.
3. Previous test results with 7- and 28-day compressive strengths.
4. Certified mill test results for cement identifying brand, type, and chemistry of cement to be used.
5. Brand, type, principle ingredient, and amount of each admixture if used.

2.08 TRENCH BEDDING MATERIAL

- A. Bedding material shall be hard and durable and shall be made by crushing sound virgin limestone. Bedding material shall conform to the requirements of ASTM C33 and shall conform to gradations shown in the Standard Specifications. No native soil shall be used for bedding material.
- B. All rigid sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Class B bedding detail as shown on Drawing 01-975-43A. Bedding material shall be CA-6.
- C. Concrete and other rigid pipe used in nonsanitary sewer applications may be bedded using the Class C bedding detail as shown on Drawing 01-975-43A. Bedding material shall be CA-7.
- D. Ductile and cast iron pipe shall be bedded in accordance with Class C bedding detail as shown on Drawing 01-975-43A, or the Type 4 laying condition of AWWA C600. Bedding material shall be CA-6 or CA-7.
- E. Thermoplastic sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Thermoplastic Pipe Bedding Detail on Drawing 01-975-43A. Bedding material shall be CA-6.
- F. All other sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Class B bedding detail as shown on Drawing 01-975-43A. Bedding material shall be CA-6.
- G. PVC water main or force main shall be bedded and covered in accordance with the Thermoplastic Pipe Bedding Detail on Drawing 01-975-43A or in accordance with the Type 4 laying condition of AWWA C605. HDPE water main or force main shall be bedded and covered in accordance with the Thermoplastic Pipe Bedding Detail on Drawing 01-975-43A or in accordance with ASTM D2774. Bedding material shall be CA-6. No native materials may be used.
- H. Bedding material for copper water services shall be FA-1, FA-2, OR FA-3.

2.09 TRENCH COVER MATERIAL

- A. Material to be placed from the bedding material to the pipe springline (haunching), and from the springline to 1 foot above the top of pipe (initial backfill) or to the top of the box storm sewers shall be termed cover material. All trenches shall be backfilled 1 foot above the top of the pipe with cover material. Cover material shall be deposited in the trench for its full width on each side of the pipe, sewers, fittings and appurtenances simultaneously in 6-inch layers and shall be compacted using hand tamping bars and/or mechanical tampers. Use special care in placing cover material to avoid injury to or movement of the pipe. Cover

material shall be gradation CA-7 (virgin crushed limestone only) meeting the requirements of the Standard Specifications. Cover material for all other pipes shall be gradation CA-7, meeting the requirements of the Standard Specifications:

- B. All bedding materials may be substituted for cover material when requested by CONTRACTOR except where polyethylene encasement is used. In such case, only those bedding materials specifically noted for polyethylene encasement may be used.
- C. Material that is to be placed from the bedding material around and to 1 foot above the top of all pipes shall be termed cover material. Except as otherwise specified, (a) cover material shall consist of durable granular particles ranging in size from fine to coarse in a substantially uniform combination, (b) unwashed bank-run sand and crushed bank-run gravel will be considered generally acceptable for cover material, (c) no stones larger than 3/4 inch in their greatest dimension shall be allowed in the cover material, and (d) native materials may be used if they conform to the above specifications. Cover material for copper piping shall be Size No. 10. Cover material for PVC pressure or other thermoplastic piping may be Size No. 10.

2.10 TRENCH BACKFILL MATERIAL

- A. Backfill shall be that material placed between the top of cover material up to subgrade for placement of restoration materials. Backfill for storm inlets shall be bedding material.
- B. When the type of backfill material is not otherwise specified or shown on the Drawings, CONTRACTOR may backfill with the excavated material, provided that such material consists of loam clay, sand, gravel, or other materials which, in the opinion of Geotechnical Engineer, are suitable for backfilling.
- C. All backfill material shall exceed a temperature of 35°F and be free from frost, cinders, ashes, refuse, vegetable or organic matter, boulders, rocks, or stone, frozen lumps, or other material which in the opinion of Testing Firm is unsuitable. From 1 foot above the top of the pipe to the trench subgrade, well-graded material containing stones up to 8 inches in their greatest dimension may be used, unless otherwise specified. Care should be taken in backfilling so as not to damage the installed pipe.
- D. In refilling the trench, if there is not sufficient material excavated therefrom suitable for refilling, CONTRACTOR shall, without extra compensation, furnish the deficiency. Where indicated on the Drawings, fill shall be provided over projecting conduits. Such fill shall be free of large boulders, and the top 6 inches shall be of suitable material to fit the adjoining ground.
- E. When called for on the Drawings, in the Specifications, or requested by ENGINEER, backfill material shall be virgin crushed limestone. Sufficient fine material shall be present to fill all the voids in the coarse material. No stones over 3 inches or clay lumps shall be present. Unless otherwise allowed by ENGINEER, granular backfill shall be CA-7 meeting the requirements of the Standard Specifications.
- F. Trench backfill material for trenches beneath or within 5 feet of existing or proposed pavement, sidewalks, curb and gutter, driveways, or where indicated on the Drawings, shall be CA-7 meeting the requirements of the Standard Specifications.

- G. Trench backfill for water services shall be FA-1, FA-2, or FA-3 meeting the requirements of the Standard Specifications.

PART 3-EXECUTION

3.01 GENERAL

- A. Prior to all excavating, CONTRACTOR shall become thoroughly familiar with the site and site conditions.

3.02 PROTECTION

- A. CONTRACTOR shall provide all necessary sheeting, shoring, or other soil retention systems including all labor, material, equipment, and tools required, or as necessary to maintain the excavation in a condition to provide safe working conditions, to permit the safe and efficient installation of all items of Contract work, and to protect adjacent property. CONTRACTOR shall be held liable for any damage which may result to property from excavation or construction operations. Sheeting, shoring, and other soil retainage systems shall be withdrawn or removed in a manner so as to prevent subsequent settlement of structures, utilities, and other improvements.
- B. Design of sheet piling and other soil retaining systems shall be the sole responsibility of CONTRACTOR. Where such systems are shown on the Drawings, no parameters such as embedment depth, section profile, presence or lack of walers, etc., nor system type or suitability shall be inferred. CONTRACTOR is responsible for designing and providing a fully functional system compatible with construction and site requirements.
- C. Nothing in this specification shall be deemed to allow the use of protective systems less effective than those required by the Occupational Safety and Health Administration (OSHA) and other applicable code requirements.

3.03 FINISH ELEVATIONS AND LINES

- A. CONTRACTOR is responsible for establishing finish elevations and lines.
- B. Where lasers are used, CONTRACTOR shall check the Work against intermediate grade stakes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.
- C. If existing property stakes, not within the limits of the trench or street slope limits, are removed or damaged by CONTRACTOR, CONTRACTOR shall bear the cost of replacement. Replacement shall be made by a legal survey performed by a licensed Land Surveyor hired by OWNER. Cost for survey shall be deducted from the Contract Price.

3.04 COMMON EXCAVATION

- A. After the site has been cleared and stripped, the site shall be cut and filled to the indicated subgrade as shown or specified and as recommended by the Geotechnical Engineer.

- B. All excavated material that does not meet the specification for compacted fill or embankment fill or meets the specification but is not required for backfill or fill shall be classified as excess material and shall be removed from the site and disposed of at CONTRACTOR's expense.
- C. All material other than suitable bearing soil or bedrock, as determined by the Testing Firm, shall be removed from under concrete to be poured on ground.
- D. Excavation for all footings, foundation walls, pits, etc., shall be large enough to provide adequate clearance for the proper execution for the work within them.
- E. Excavations scheduled to extend below groundwater shall not be started until the area has been dewatered. See Section 31 23 19–Dewatering.
- F. High plasticity soils shall be undercut a minimum 12 inches below floor subbase and final subgrade elevation and replaced with structural compacted fill.
- G. When excavations reach subgrade elevations as shown on the Drawings or as specified herein, the Testing Firm will observe the bottom material. Where, in the opinion of the Testing Firm, unsuitable foundation material is found at the level of the subgrade, unsuitable foundation material shall be removed and replaced with material and placing methods as specified under compacted fill and backfill.
- H. Excavations that are undercut beneath the foundation shall extend beyond the perimeter of the foundation 1 foot plus a distance at least equal to the depth of undercut below footing grade.
- I. CONTRACTOR shall backfill and compact all overexcavated areas.
- J. All street excavation shall be performed as called for in Section 205 of the Standard Specifications and as herein modified.
- K. The following items of Work shall be included in common excavation:
 - 1. The excavation to subgrade elevations as detailed in the Drawings including road bed areas, terraces, sidewalks, bike paths, driveways, and other miscellaneous surface improvements.
 - 2. Removal (and stockpiling, if the use of salvaged topsoil is required) of topsoil from all cut areas and fill areas within a 1:1 slope of finished street, sidewalks, bike paths, driveways, and other miscellaneous surface improvements.
 - 3. The preparation, grading, compaction, and proof-rolling of subgrade areas for roadbed, sidewalks, bike paths, driveways, and other miscellaneous surface improvements to the elevations detailed on the Drawings.
 - 4. Excavation and grading required to realign and/or create ditch lines and drainage ways to route drainage to or from storm facilities as shown on the Drawings, or as necessary to maintain positive drainage.
 - 5. Removal of temporary backfill placed in new utility trenches above the subgrade.
 - 6. The removal and disposal of all undesirable and surplus materials.
- L. Common excavation may be completed as part of utility construction prior to initiating general street excavation activities.
- M. All subgrade areas in streets and parking lots, including utility trench restoration areas, shall be proof-rolled with a heavily loaded triaxle dump truck or other similar equipment requested

by ENGINEER prior to the placement of any fill materials or base course. OWNER and ENGINEER must be present during proof-rolling to review the Work necessary for the stabilization of any unstable areas identified. Base course placed on unstable or yielding foundation or subgrade shall be removed and then replaced at CONTRACTOR's expense following excavation below subgrade of the affected area.

- N. Saw cuts shall be made in existing pavement, driveways, curb and gutter, and sidewalks to allow restoration to neat straight lines. Saw cuts damaged during construction shall be recut prior to beginning restoration.
- O. CONTRACTOR shall salvage suitable materials from utility and street construction activities to provide fill for street construction. Where sufficient quantities of materials suitable for street construction are not available from areas of the site, CONTRACTOR shall perform borrow excavation to make up the deficit in accordance with Section 208 of the Standard Specifications.
- P. CONTRACTOR shall be responsible for making its own determination of the common excavation quantity when compiling the lump sum bid.

3.05 UTILITY TRENCH EXCAVATIONS

- A. Caution In Excavation; CONTRACTOR shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures may be determined and shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on its part.
- B. Subsurface Exploration: When determined that it is necessary to explore and excavate to determine the location of existing underground facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is asked to perform additional Work in making the explorations and excavations, extra compensation will be allowed as specified In the General Conditions.
- C. The trench shall be dug so that the utilities can be laid to the alignment and depth specified. Unless otherwise allowed by ENGINEER, trenches shall not be excavated more than 100 feet in advance of pipe laying. Common excavation shall include all excavation including rock. Included in common excavation shall be removal of street paving of all types, existing structures, existing improvements and trees smaller than 4 inches in diameter measured 4 feet above the ground, all as necessary to complete the pipe installation.
- D. The trench shall be finished to the depth necessary to provide a uniform and continuous bearing and support for the pipe on the bedding material provided at every point between bell holes. Any part of the bottom of trench excavated below the specified grade shall be corrected with bedding material, thoroughly compacted in place. The bedding shall be shaped and finished with hand tools to fit the bottom quadrant to the pipe.
- E. If unstable soil conditions are encountered at subgrade, CONTRACTOR shall replace the unstable soil with special bedding. CONTRACTOR shall be allowed extra compensation for the special bedding, unless the unstable soil conditions are caused by CONTRACTOR's failure to adequately dewater the trench, in which case CONTRACTOR shall bear the entire cost.

- F. All excavated material shall be piled in a manner that will not endanger the Work. Stockpiles not for immediate backfilling shall have silt fences placed around their perimeter for erosion control. The Work shall be conducted in such a manner that pedestrian and motor traffic is not unnecessarily disrupted. Fire hydrants, valve boxes and manholes shall be left unobstructed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.
- G. Excavated material designated by ENGINEER as being undesirable for backfilling and all surplus excavated material shall be immediately removed as excavation progresses. All such material shall be disposed of in an environmentally safe manner in accordance with local, state, and federal regulations. No such materials shall be disposed of in wetlands, floodplains, or other environmentally sensitive areas. Disposal sites are also subject to approval of OWNER. All undesirable and surplus material disposed of must be leveled off and graded to rough elevations as determined by OWNER. Appropriate erosion control measures shall be provided and maintained at disposal sites until disposal is complete and the disposal site is permanently stabilized.
- H. CONTRACTOR shall remove bituminous pavement and road surface as a part of the trench excavation. The width of pavement removed shall be the minimum possible, and acceptable, for convenient and safe installation of utilities and appurtenances.
- I. All bituminous pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the trench.
- J. Where it is necessary to trench through concrete pavement, a strip shall be sawed and removed in such a manner as not to disturb the remainder of the pavement. Paving and undermining of existing concrete pavement shall be prevented by CONTRACTOR. If CONTRACTOR unnecessarily removes or damages pavement or surfaces beyond limits acceptable to ENGINEER, such pavement and surfaces shall be replaced or repaired at the expense of CONTRACTOR.
- K. All trees, shrubs, and improved areas outside the excavation shall be protected from damage.
- L. Pipe shall be placed only on dry foundations.
- M. Excavation shall include all necessary incidental work such as tunneling, sheet piling, shoring, underpinning, pumping, bailing, transportation, and all fill and backfilling.
- N. CONTRACTOR shall excavate whatever materials, are encountered as required to place at the elevations shown, all pipe, manholes, and other work as required to complete the project as shown.
- O. The excavation at the crossing of all underground utility services in place shall be as narrow as practicable. All underground services shall be protected from damage and maintained in service at their original location and grade during the process of the work. Any damage to underground services shall be replaced or repaired at no cost to OWNER or to the owner of the service. The present underground services shown on the Drawings are located in accordance with available data. Encountering these services at a different location or encountering services not shown shall not release CONTRACTOR from the above-stated conditions

- P. Any water, drainage, gas sewer, or electric lines encountered in the excavation that are not to be disturbed shall be properly underpinned and supported. Any service connections encountered that are to be removed shall be cut off at limits of the excavation and capped in accordance within the requirements of or permits governing such removals. Any permits required for this work will be obtained by OWNER upon request of CONTRACTOR.
- Q. CONTRACTOR shall be responsible for determining and providing the minimum width necessary to provide a safe trench in accordance with current OSHA standards and all other applicable standards. The top width of trench excavation shall be kept as narrow as is reasonably possible and acceptable to minimize pavement damage. Pay items related to maximum trench widths shall not limit CONTRACTOR's responsibility to provide safe trench conditions.
- R. Width of Trench—Rigid Pipe: The width of trench below the outside top of the pipe shall be as shown in the following table for the sizes listed. A minimum clearance of 8 inches between the outside of the pipe barrel and the trench wall at the pipe spring line shall be maintained to allow for bedding and haunching. If sheeting is used and is going to remain in place, the trench width shall be measured as the clear distance between inside faces of the sheeting. Otherwise, the trench width shall be based on the width between stable trench walls after sheeting is removed.

MAXIMUM WIDTH OF TRENCH BELOW TOP OF PIPE

Nominal Pipe Diameter (Inches)	Trench Width (Inches)
4	30
6	30
8	36
10	36
12	36
15	36
18 and larger	Pipe O.D. Plus 16 (Minimum 36)

- S. Where the width of trench below the outside top of the pipe barrel cannot be otherwise maintained within the limits shown above, CONTRACTOR, at its own expense, shall furnish an adequate pipe installation for the actual trench width which will meet design conditions. This may be accomplished by furnishing higher class bedding, a stronger pipe, concrete cradle, cap or envelope or by driving sheeting prior to excavation to subgrade. Removal of sheeting below the top of the pipe, if allowed by ENGINEER, shall be gradual during backfilling.
- T. If the maximum trench width is exceeded for any reason other than by request of ENGINEER, the concrete cradle, cap, sheeting, bedding or the stronger pipe shall be placed by CONTRACTOR at its own expense. Where the maximum trench width is exceeded at the written request of ENGINEER, the concrete cradle, cap, sheeting, bedding or stronger pipe will be paid for on the basis of the price bid.
- U. Width of Trench—Thermoplastic and Ductile Iron Pipe: The trench width for flexible pipe shall be minimum three times the pipe outside diameter or the maximum trench width specified for rigid pipe, whichever is greater. A minimum clearance of 8 inches between the outside of

the pipe barrel and the trench wall at the pipe spring line shall be maintained to allow for bedding and haunching.

- V. Special bedding shall consist of stone material and filter fabric as described herein. Where the bottom of the trench at subgrade is found to be unstable or of unsuitable material, which should be removed, CONTRACTOR shall excavate and remove such unstable or unsuitable material to the trench width and to a depth of 2 feet. The excavated area shall be lined with filter fabric, Mirafi 140 N, US Fabrics US 120NW, Propex Geotex 401, or equal, and backfilled with bedding material in maximum 12-inch layers. At subgrade the filter fabric shall be wrapped over the special bedding with an 18-inch overlap. Bedding material shall then be placed over the special bedding to support the piping. See Dewatering and Excavation to Subgrade sections for additional conditions.
- W. If soil conditions require it, concrete cradle or encasement shall be placed around the pipe as shown on Drawing 01-975-43A. Excavation shall be carried below the grade line to a depth requested by ENGINEER and concrete cradle or encasement placed. Before the concrete is placed, the pipe shall be laid to line and grade, blocked and braced, and the joint made. The cradle shall then be placed, taking care not to disturb the pipe. Concrete shall have a minimum 28-day compressive strength of 4,000 psi. Concrete cradle shall not be used for thermoplastic piping. See Trench Width section for additional conditions.
- X. Open-cut trenches shall be sheeted and braced as required by any governing federal regulations including OSHA, state laws, and municipal ordinances; and as may be necessary to protect life, property, improvements or the Work. Underground or aboveground improvements to be left in place shall be protected and, if damaged, shall be repaired or replaced at the expense of CONTRACTOR.
- Y. Sheet piling and bracing which is to be left in place must be removed for a distance of 4 feet below the present or proposed final grade of the street, road, or land, whichever is lower. Trench bracing, except that which shall be left in place, may be removed after backfilling has been completed or has been brought up to such an elevation as to permit its safe removal.
- Z. Portable Trench Box: Whenever a portable trench box or shield is used, special precautions shall be taken so as not to pull already jointed pipe apart or leave voids around the pipe wall. Whenever possible, the bottom edge of the box shall be kept at a level approximately even with the top of pipe. Cover material shall be placed to at least the top of pipe before moving the box ahead.
- AA. All trenches shall be backfilled using specified material so that excessive lengths of trench are not left open. In general, the backfilling operation shall proceed so that no more than 100 feet of trench is open behind the pipe laying operation.
- BB. Backfill shall be left below the original surface to allow for placement of restoration materials including pavement, base course, concrete, topsoil, sod, plus any pavement replacement specified in accordance with the Asphaltic Paving section herein. When settlement occurs, CONTRACTOR shall restore the surface improvements at its expense to maintain the finished surface.

3.06 PREPARATION OF SUBGRADE

- A. After the site has been cleared, stripped, and excavated to subgrade, thoroughly compact subgrade to the requirements specified for compacted fill below. Scarify and moisture condition the subgrade as recommended by the Geotechnical Engineer.
- B. Remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement of fill.
- C. ENGINEER may request the excavation of unsuitable materials in areas of unstable subgrade. The excavation of such materials, except in areas where CONTRACTOR has completed utility construction or placed street fill, shall be measured by ENGINEER for payment.
- D. The excavation and replacement of unstable utility trench backfill and/or street fill placed by CONTRACTOR shall be at CONTRACTOR's expense.
- E. Base course placed on unstable foundation shall be removed and replaced at CONTRACTOR's cost following excavation of the affected area.
- F. Where requested by ENGINEER in the field, excavation below subgrade areas shall be lined with geotextile material as specified in Section 31 23 19–Geotextiles and backfilled with 3-inch crushed stone dense graded base as specified herein.
- G. Geotextile shall be placed where requested by ENGINEER to stabilize street subgrade areas. Fabric shall be as specified in Section 31 23 19– Geotextiles. Vibratory compaction shall not be used in the compaction of base course in areas where geotextile fabrics are used.

3.07 COMPACTED FILL AND BACKFILL

- A. All fill and backfill, except as otherwise specified, shall be compacted fill placed to within 4 inches of the bottom of the topsoil or to the bottom of the structure or other improvement.
- B. Unless otherwise noted, structures with a top slab shall not be backfilled until the slab is in place and has reached its specified 28-day strength.
- C. In fill areas above existing grade around structures, compacted fill shall be placed within a minimum of 10 feet from the structure.
- D. No fill shall be placed under water or over unsuitable subgrade conditions.
- E. All fill and backfill, except embankment fill and clay fill, shall be compacted as follows:
 - 1. Class 1 Compaction: This class of compaction shall apply to all fill areas under buildings, structures, piping, bituminous roadway and parking areas, curb and gutter, and backfill within 10 feet of structure walls. All compacted material shall be placed in uniform layers not exceeding 8 inches in loose thickness prior to compaction. Each layer shall be uniformly compacted to a dry density at least 98% (per Rubino Appendix C) of the maximum dry density as determined by a laboratory compaction test at the optimum moisture content (ASTM Test Designation D698). Compaction shall be obtained by compaction equipment appropriate for the conditions.

2. Class 2 Compaction: This class of compaction shall be used in excavated areas beyond 10 feet of structures without any piping or adjacent foundations. Material for backfill shall be granular material as specified above. The material shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer of the fill shall be compacted to at least 95% (per Rubino Appendix C) of the maximum dry density (testing same as Class 1). Compaction shall be obtained by compaction equipment appropriate for the conditions.

- F. No frozen material shall be placed nor shall any material be placed on frozen ground.
- G. Four inches of clay fill shall be placed and compacted to at least a firm consistency in areas to be seeded or sodded prior to placement of topsoil.

3.08 EMBANKMENT FILL

- A. Embankment fill may be placed in fill areas to be seeded or sodded if no piping exists in the fill and the areas are at least 10 feet from any structure.
- B. Embankment fill shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be obtained for each layer before any material for a succeeding layer is placed thereon. Compaction shall be obtained using the hauling and leveling equipment, and in addition, tamping rollers, pneumatic-tired rollers, vibratory rollers, or other types of equipment required to produce the desired results.

3.09 CONCRETE FILL

- A. In areas where there is inadequate room for compaction equipment and in other areas as shown or specified, flowable fill shall be used as fill material.
- B. Where concrete fill (flowable fill) is used as backfill, the initial lift used to cover the subgrade shall not exceed two feet in total height and be cured for four days prior to subsequent lifts. Remaining lifts shall be placed in maximum heights of two feet and cured for 24 hours prior to placement of the next lift.

3.10 PLACING GRANULAR CUSHION AND VAPOR BARRIER

- A. When subgrade is prepared for slab-on-grade areas, CONTRACTOR shall place the vapor barrier and granular cushion.
- B. Specific location of vapor barrier (whether directly under slab or under granular cushion) shall be as shown on the Drawings.

3.11 PLACING CRUSHED STONE AND GEOTEXTILE FABRIC

- A. The same day that the subgrade is exposed, place geotextile fabric on subgrade, and place 12 inches of crushed stone mat below tank slabs, manholes, vault slabs, and basement floors. Compact in place.

- B. Geotechnical fabric shall extend up the side edge of the stone mat and extend across the top of the stone to a minimum of 12 inches past the edge of base slab.

3.12 PIPE BEDDING AND COVER

- A. Immediately prior to placing the pipe, the trench bottom shall be shaped by hand to fit the entire bottom quadrant of the pipe. If pipe is of the bell and spigot type; bell holes shall be provided to prevent the bell from supporting the backfill load. Bell holes shall be large enough to permit proper making of the joint, but not larger than necessary to make the joint. All adjustments to line and grade must be done by scraping away or filling in bedding material under the body of the pipe. Any fill used must be bedding material. If necessary to obtain uniform contact of the pipe with the subgrade, a template shall be used to shape the bedding material. All pipe shall be placed on bedding material at least 4 inches thick. See Drawing 01-975-43A. Bedding material shall then be placed and tamped into place up alongside the pipe in maximum 6-inch layers shovel slicing the bedding material under the haunches to provide firm contact with the pipe. CONTRACTOR shall perform all necessary excavation and shall furnish all necessary material to provide this bedding.
- B. Trenches shall be kept water-free and dry during bedding, laying, and jointing. CONTRACTOR shall provide, operate, and maintain all pumps or other equipment necessary to drain and keep all excavation pits and trenches and the entire subgrade area free from water under any and all circumstances that may arise.

3.13 TRENCH BACKFILL CONSOLIDATION

- A. All trenches shall be consolidated as specified in this section for the entire depth and width of the trench.
- B. Consolidation shall be achieved by use of smooth surface vibratory compactors or backhoe operated hydraulic compactors for granular materials and rotating sheepsfoot type mechanisms for loam/clay soils. The lift height shall not exceed 6 inches (per Rubino Appendix C) for walk behind, hand operated, vibratory compactors and sheepsfoot. Lift height shall not exceed 24 inches for self-propelled vibratory drum or backhoe operated hydraulic compactors. Smaller lift heights shall be provided as necessary to achieve the degree of compaction specified.
- C. Unless specified otherwise, backfill material beneath paved areas or future paved areas and within 5 feet of paved areas or future paved areas shall be consolidated as follows: Within 3 feet of the surface 95% of maximum dry density, below 3 feet from the surface to 1 foot above the pipe 90% of maximum dry density, as determined by the modified Proctor Test (ASTM D1557).
- D. Unless otherwise specified, backfill material placed in all other areas shall be compacted to the point where no additional consolidation can be observed from the compaction and backfill equipment being used.
- E. Backfill material not meeting the compaction specification shall be recompacted by CONTRACTOR at no cost to OWNER. Cost for additional testing on recompacted material shall be at CONTRACTOR's expense.

3.14 GRADING

- A. CONTRACTOR shall perform all rough and finish grading required to attain the elevations shown on the Drawings.
- B. Grading Tolerances:
 - 1. Rough Grade: Buildings, parking areas, and sidewalks— ± 0.1 feet.
 - 2. Finish Grade: Granular cushion or crushed stone mat under concrete slabs— ± 0.03 feet.
 - 3. Lawn areas away from buildings, parking areas, and sidewalks— ± 0.25 feet.

3.15 MAINTENANCE OF SURFACE

- A. CONTRACTOR shall maintain all backfilling, resurfacing, repaving, and other surface improvements constructed under this Contract. CONTRACTOR shall, upon proper notice from OWNER, make all repairs in surfaces of trenches and excavations. All expenses incurred by OWNER and/or CONTRACTOR in making repairs and all expenses in maintaining trench and excavation surfaces shall be at the expense of CONTRACTOR regardless of the material used in backfilling trench excavations. OWNER reserves the right to make all emergency repairs necessary to make safe all streets and walks at the expense of CONTRACTOR regardless of the material used in backfilling trench excavations. A maintenance guarantee fund, if specified, will be withheld from the final amount due CONTRACTOR for a period of 6 months, after acceptance of the Work, to provide such maintenance.
- B. CONTRACTOR shall be responsible for controlling dust dispersion during utility and street construction. Remedial actions required as a result of inadequate dust control shall be CONTRACTOR's responsibility. To control dust, CONTRACTOR shall apply calcium chloride or ammonium lignin sulfonate in 12 to 14% solution or other dust control palliative acceptable to OWNER. Prior to application of dust palliative, the street shall be graded smooth.

3.16 COMPACTION TESTING

- A. Compaction tests shall be done by the Testing Firm. Location and frequency of the tests shall be as recommended by the Testing Firm and paid for by OWNER.

3.17 EXCAVATED SOLID WASTE FILL MATERIALS TO BE LANDFILLED

- A. If any solid waste fill materials are encountered, they shall be excavated and removed to a licensed sanitary landfill. Solid waste fill material is defined as any construction or demolition debris, household refuse, glass, metal, plastic, or similar material not native to the site, but having been placed on-site during past filling operations and mixed with soil.

3.18 POTENTIALLY HAZARDOUS WASTE

- A. If CONTRACTOR encounters during excavation or trenching activities any potentially hazardous waste as defined in this section, and the materials are within the limits of the site excavation or trenching work, the materials shall be handled as specified in this section. Potentially hazardous waste is defined as any drums, containerized waste, or organic liquid waste or surrounding impacted material. Such materials have not been found during investigations performed to date but could potentially be encountered.

- B. Should potentially hazardous waste be encountered, excavation activities in that portion of the site shall be placed on standby pending removal of the material, receipt of test results, and determination by the IEPA and OWNER on whether work may proceed. It is anticipated that this standby time will be approximately 48 hours per occurrence, exclusive of weekends and holidays.
- C. Potentially hazardous waste defined above shall be carefully excavated, stockpiled, and tested to determine if they exhibit the characteristics of a hazardous waste as defined by the Title 35 Illinois Administrative Code, Parts 700-739. Such materials shall be handled according to applicable IEPA, USEPA, and OSHA regulations and shall be stockpiled in a "Temporary Excavated Material Storage Area" as specified in Division 01. Stockpiling shall meet the requirements of NR 700.

3.19 CLEAN CONSTRUCTION OR DEMOLITION DEBRIS

- A. CONTRACTOR shall comply with 35 Ill. Adm. Code 1100 when disposing of clean construction or demolition debris (CCDD) or uncontaminated soil at a CCDD or uncontaminated soil fill operation.
- B. None of the Drawings, Specifications, or geotechnical reports shall be considered a guarantee that excavated material shall meet the requirements of 35 Ill. Adm. Code 1100, and CONTRACTOR shall be responsible for satisfactory removal and disposal of all material as specified herein. No additional environmental testing of the existing on-site material may be performed without the written permission of OWNER, CONTRACTOR shall be required to properly and legally dispose of all material from the project site, regardless of its suitability for disposal in a CCDD facility, at CONTRACTOR'S expense, without any additional payment for testing, hauling, and disposal as specified below.
- C. CONTRACTOR shall consult at least three CCDD facilities for confirmation of acceptance of material from this project prior to submitting a bid for this project. CONTRACTOR shall base its bid on hauling all CCDD generated by this project and shall provide the name, location, and contact information of intended facilities to OWNER upon award of Contract to CONTRACTOR. No additional compensation will be allowed for hauling to any other facilities, for any reason, unless none of the indicated facilities will accept the material. In the case where none of CONTRACTOR's indicated facilities will accept the material, CONTRACTOR shall attempt to locate an alternate facility, unless the material is classified as unsuitable for disposal in a CCDD facility, in which case it shall be hauled to a landfill and paid for as specified below. Any costs associated with additional sampling, analysis, and/or reporting to meet the acceptance requirements of an intended facility shall be borne by the bidding CONTRACTOR and included within CONTRACTOR's bid. By submitting a bid, CONTRACTOR agrees that the intended facilities will accept the material and shall be used for disposal of all CCDD from this project, unless otherwise determined to be non-hazardous special waste as specified below. In the event that CONTRACTOR needs to alter the CCDD facility used for placement of excavated material, CONTRACTOR shall notify OWNER no less than three days in advance of the planned alteration. In no event shall material be hauled to an alternate facility without the written permission of OWNER.
- D. Construction Requirements:
 - 1. CONTRACTOR shall be responsible for satisfactory removal and disposal of all waste material, asphalt, concrete, stone, dirt, and debris generated or discovered in the course of the work. Removal and disposal of excavation items being disposed of at a CCDD

facility shall meet the requirement of 35 Ill. Adm. Code 1100. This work shall be incidental and shall not be paid for separately, with the exception of the NON-CCDD MATERIAL DISPOSAL as specified below.

2. If material is rejected at the CCDD facility, it shall be returned to the project site and quarantined for further evaluation. No additional compensation shall be allowed for returning a reject load back to the project site or for any other additional hauling, loading, unloading, etc. as may be required. Should it be determined that the material is not suitable for disposal in a CCDD facility, CONTRACTOR shall be responsible for properly disposing of the material at an acceptable landfill and providing OWNER with all the proper paperwork to document the material disposal with the IEPA. This work shall be paid for as specified below.
3. All work to satisfy these requirements shall be the responsibility of CONTRACTOR. All costs associated with meeting these requirements shall be included in CONTRACTOR's bid for installation of the associated pipe or structure. These costs shall include, but are not limited to, all required testing, lab analysis, and certification by a licensed professional engineer (PE) or licensed professional geologist (PG), if required, in addition to the cost of additional hauling, dump fees, etc.
4. CONTRACTOR shall INCLUDE in its Bid the cost of removing, hauling, and disposing of in a licensed landfill 20 tons of excavated solid waste fill material not suitable for disposal in a CCDD facility. The cost shall include excavation, any testing required by the landfill, transportation, additional safety considerations, and disposal fees. Payment for non-CCDD material excavation and disposal will be adjusted, add or deduct, based upon the actual amount of fill material excavation and disposal (more or less than 20 tons) at the unit price for REMOVAL AND DISPOSAL OF NON-CCDD MATERIAL.
5. Landfill tonnage shall be based on weight tickets. Copies of all weight tickets for landfilled material shall be provided to OWNER for documentation purposed to calculate actual quantities. Weight tickets shall be duly and accurately completed. Weight tickets with incomplete or illegible information shall not be acceptable.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Removal of groundwater to allow belowgrade construction.
 - 2. Site grading to prevent surface water from entering the excavation.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. Payment:
 - 1. The expense for making all extra excavations necessary to prevent water from interfering with the proper construction of the work and for forming all dams or diversions, digging of sumps or pump wells, bailing, and installation and pumping of wells shall be borne by CONTRACTOR.
 - 2. The cost for removal of groundwater and surface water shall be included in the prices bid for the work. No separate payment will be made for dewatering whether accomplished by use of sumps and pumps, well point systems, deep wells, or any other method.
 - 3. Any permits necessary for the dewatering operations shall be obtained and paid for by CONTRACTOR.

1.02 REFERENCES

- A. Illinois Urban Manual.
- B. See Section 01 41 00—Regulatory Requirements for permit requirements and water, erosion, and sediment control.

1.03 SYSTEM REQUIREMENTS

- A. CONTRACTOR shall, at its own expense, keep the excavation clear of water while structures, mains, and appurtenances are being built, utilities are being installed, and fill and backfill are being compacted. Under no conditions shall the work be laid in or under water. No water shall flow over the work until the joints are complete or the concrete has set.
- B. Wherever necessary, CONTRACTOR shall excavate in advance of the completed work, lead the water into sumps or pump wells, and provide erosion control measures to prevent water or sediment damage.
- C. CONTRACTOR's dewatering system shall perform so that the soils within the trench will not be destabilized by hydrostatic uplift pressures from adjacent groundwater. If conditions warrant, CONTRACTOR shall furnish and install well point systems or deep wells.

- D. Dewatering shall be sufficient to lower the piezometric level to at least 2 feet below the bottom of the excavation. Additional lowering shall be provided as necessary to create a stable subgrade.
- E. In areas where rock is encountered, the water level shall be kept at or below top of rock, but at least 6 inches below bottom of concrete. Additional rock shall be removed as needed to provide clearances.
- F. The control of groundwater shall be such that softening or heaving of the bottom of excavations or formation of "quick" conditions or "boils" shall be prevented.
- G. Dewatering systems shall be designed and operated so as to prevent the migration or removal of soils.

1.04 QUALITY ASSURANCE

- A. All dewatering shall be done in accordance with Illinois Urban Manual Code 813 and with all other applicable federal, state, and local code requirements.
- B. In particular, groundwater observation wells shall be provided and subsequently abandoned in accordance with the Illinois Urban Manual Code 996. CONTRACTOR shall complete all observation well construction and abandonment forms as required and shall submit the forms to OWNER within 15 days of construction or abandonment activities.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

3.01 DEWATERING

- A. Dewatering shall be started, and the water level shall be lowered as specified herein prior to beginning excavation and shall be continued until structure, main, or appurtenance has been completed and fill has been placed and compacted to final grade.
- B. CONTRACTOR shall provide all necessary materials and equipment to keep the excavation free from water during construction. CONTRACTOR shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages, and shall have available at all times competent workers for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays or weekends, or during the work stoppages.
- C. CONTRACTOR shall meet all requirements of applicable IEPA permits for construction pit or trench dewatering.
- D. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill, and prevent floatation or movement of all structures and pipelines.

3.02 PROTECTION

- A. CONTRACTOR shall take all necessary precautions during the dewatering operation to protect adjacent structures against subsidence, flooding, or other damage. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. Any such facilities and structures damaged shall be repaired or replaced to the satisfaction of their owner.
- B. In areas where continuous operation of dewatering pumps is required, CONTRACTOR shall avoid noise disturbance to nearby residences to the greatest extent possible by using electric-driven pumps, or intake and exhaust silencers or housing to minimize noise from engine-driven generators or engine-driven pumps.

END OF SECTION

SECTION 31 25 00

SLOPE PROTECTION AND EROSION CONTROL

PART 1-GENERAL

1.01 SUMMARY

- A. Work Included: Erosion Control Devices.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 PAYMENT

- A. All costs associated with slope protection and erosion control shall be included in CONTRACTOR's Bid. This work shall include, but is not limited to, erecting fence, excavation, placing posts, backfilling, attaching woven wire and geotextile fabric; placing ditch checks; installing sediment traps; removing the fence at completion of project; cleaning and repairing; removing or spreading accumulated sediment to form a surface suitable for seeding; replacing silt fence and damages caused by overloading of sediment material or ponding of water adjacent to silt fence; and furnishing labor, tools, equipment, and incidentals necessary to complete the work in accordance with the Contract.

1.03 REFERENCES

- A. Illinois Urban Manual published by the Natural Resources Conservation Service (NRCS) in Illinois (<http://www.nrcs.usda.gov>).

1.04 REGULATORY REQUIREMENTS

- A. Land disturbance greater than one acre and OWNER obtains NOI. OWNER has prepared a Stormwater Pollution Prevention Plan, referred to herein as SWPPP, in conjunction with the development of the Contract Documents and has submitted a "Notice of Intent" (NOI) for Storm Water Discharges Associated with Land Disturbing Activities. The NOI is included as an attachment to the Contract Documents. CONTRACTOR as designated operator of activities at the construction site shall be responsible for compliance with all permit conditions. This includes, but is not limited to, the following:
 - 1. Implement erosion and sediment control practices necessary to meet federal, state, and local performance standards.
 - 2. Receive required approvals from OWNER and regulatory agencies for any modifications to the erosion control plan necessitated by site conditions or CONTRACTOR's operations.
 - 3. Provide a "qualified" inspector to inspect erosion control and sediment controls. Inspector shall have prior experience with and knowledge of installation and maintenance of erosion and sediment controls. Inspector shall be identified to OWNER.
 - 4. Perform all inspection, maintenance, and record keeping activities required by the permit. This shall include inspecting erosion and sediment control facilities weekly and within 24 hours after a precipitation event of 0.5 inches or greater. CONTRACTOR shall maintain weekly written reports of all inspections.

5. CONTRACTOR shall respond within 24 hours to all corrective measures noted on the inspection report to address pollution issues.
6. CONTRACTOR shall submit to OWNER a written notice stating the times, dates and actions taken to rectify the defective pollution and erosion controls.
7. Pay any fines or other fees resulting from failure of CONTRACTOR to comply with the permit requirements.
8. Submit a "Notice of Termination" (NOT) to IEPA at end of the Project.

- B. CONTRACTOR and its subcontractors shall execute and sign the following certification:

"I certify under penalty of law that I understand the terms and conditions of the General Pollutant Discharge Elimination System Permit that authorizes the storm water discharges associated with industrial activities from the construction site and as may be detailed in the Contract Documents. I agree to indemnify and hold OWNER harmless from any claims, demands, suits, causes of action, settlements, fines, or judgments and the costs of litigation, including, but not limited to, reasonable attorneys' fees and costs of investigation and arising from a condition, obligation or requirement assumed or to be performed by CONTRACTOR for storm water pollution and erosion control."

- C. CONTRACTOR shall pay any fines or other fees resulting from failure of CONTRACTOR to comply with the permit requirements, or federal, state, or local regulations and requirements.

1.05 QUALITY CONTROL

- A. Construct and maintain erosion sediment control measures in accordance with the Illinois Urban Manual.
- B. Check facilities weekly and after any rainfall event, and make needed repairs within 24 hours.

PART 2-PRODUCTS

2.01 EROSION MATS

- A. Uniform web of interlocking wood excelsior fibers, with a net backing on one side. The wood from which the blanket is produced shall have been properly cured to achieve adequately curled and barbed fibers. The blanket shall be of uniform thickness with the wood fibers evenly distributed over the entire area of the blanket. The blanket shall be furnished in rolled strips. The width of the strips shall be 48 inches, ± 1 inch. Weight of blanket measured under average atmospheric conditions shall be 78 pounds per 80 square yards, $\pm 10\%$. Net backing shall have mesh size not exceeding 1 1/2 by 3 inches and may be woven from twisted paper, cotton cord, or other alternate method. The blanket shall be nontoxic to vegetation.

2.02 SILT FENCE

- A. Use geotextile fabric consisting of either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride with the following requirements. Fabric shall have the minimum strength values in the weakest principal direction. Nonwoven fabric may be needle punched, heat bonded, resin bonded, or combination thereof.

VALUE MINIMUM REQUIREMENTS ⁽¹⁾

Test	Method	Silty Soils ⁽⁴⁾	Sandy Soils ⁽⁵⁾
Grab Tensile-Strength/ Strip-Breaking Force	ASTM D-5034, D5035 ⁽²⁾	100	100
Mullen Burst Strength (psi)	ASTM D-3786	200	200
Equivalent Opening Size	CW-02215-77	50-140	20-50
U.S. Standard Sieve	Corps of Engineers		
Water Flow Rate (gal/min/ft. ² at 50 MM Constant Head	ASTM D-4491 ⁽³⁾	10	10
Ultraviolet Radiation Stability (percent)	ASTM D-4355	90	90

- (1) All numerical values represent minimum average roll values (i.e., the average of test results on any roll in a lot should meet or exceed the minimum values in the table).
- (2) ASTM D-5034 Grab Test and ASTM D-5035 Breakout Force and Elongation Strip Method, Method 16, using a 4-inch by 8-inch sample, 3-inch gauge length clamped in 1-inch by 2-inch long grip, tested at a strain rate of 12 inches/min.
- (3) Water Flow Rate in gal/min/ft shall be determined by multiplying Permittivity in sec. as determined by ASTM D4491 by a conversion factor of 74.
- (4) Silty Soil: More than 15% by weight passing No. 200 sieve.
- (5) Sandy Soil: Less than 15% by weight passing No. 200 sieve.

- B. Furnish geotextile fabric in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion because of shipping and handling. Keep geotextile dry until installed.

2.03 GEOTEXTILE FABRIC

- A. See Section 31 32 19–Geotextiles for fabric under riprap.

PART 3–EXECUTION

3.01 GENERAL

- A. Install devices before construction activities begin, as shown on the Drawings and at all stormwater inlets and flared end sections.
- B. Proceed carefully with construction adjacent to stream channels to avoid washing, sloughing, or deposition of materials into the stream. If possible, the work area should be diked off and the volume and velocity of water that crosses disturbed areas be reduced by means of planned engineering works (diversion, detention basins, berms).
- C. Unless noted on drawings, do not remove trees and surface vegetation.

- D. Expose the smallest practical area of soil at any given time through construction scheduling. Make the duration of such exposure before application of temporary erosion control measures or final revegetation as short as practicable.

3.02 EROSION MAT INSTALLATION

- A. Place erosion mat immediately after seeding or sodding operations have been completed. Before mat placement, remove all material or clods over 1 1/2 inches in diameter and all organic material or other foreign material which interfere with the mat bearing completely on the soil or sod.
- B. Any small stones or clods which prevent contact of the mats with the soil shall be pressed in the soil with a small lawn-type roller or by other effective means. The mat shall have its lateral edge so impressed in the soil as to permit runoff water to flow over it.
- C. The matting strips shall be rolled on or laid in direction of flow. Spread mat evenly, smoothly, in a natural position without stretching and with all parts bearing on soil, and place blanket with netting on top. Overlap adjacent strips at least 4 inches. Overlap strip ends at least 10 inches. Make overlaps with the upgrade section on top.
- D. Bury upgrade end of each strip of fabric or blanket at least 6 inches in a vertical slot cut in the soil and press soil firmly against the embedded fabric or blanket.
- E. Anchor mats in place with vertically driven staples, driven until their tops are flush with the soil. Space staples at 3-foot centers along mat edges and stagger space at 3-foot centers through the center. Place staples at 10-inch centers at end or junction slots.
- F. Reseed areas damaged or destroyed during erosion mat placing operations as specified for original seeding.
- G. Dispose of surplus excavated materials and all stones, clods, or other foreign material removed in the preparation of the seeded soil or sodded surface before placing mat.
- H. Following mat placement, uniformly apply water to the area to moisten seedbed to 2-inch depth and in a manner to avoid erosion.
- I. Maintain erosion mat and make satisfactory repairs of damage from erosion, traffic, fires or other causes until work acceptance.

3.03 GEOTEXTILE FABRIC

- A. Before placing fabric, grade area smooth and remove stones, organic matter, or other foreign material which would interfere with fabric being completely in contact with soil.
- B. Place fabric loosely and lay parallel to direction of water movement. Pinning or stapling is acceptable to hold geotextile in place. Overlap or sew together separate pieces of fabric. Overlap joints a minimum 24 inches in the flow direction. After placement, do not expose fabric more than 48 hours before covering.
- C. Cover damaged areas with a patch of fabric using a 3-foot overlap in all directions.

3.04 SILT FENCE INSTALLATION

- A. Erect silt fence before starting construction operations which might cause sedimentation or siltation at site of proposed silt fence.
- B. Construct silt fence in an arc or horseshoe shape with ends pointing up slope. Construct silt fence to the dimensions and details shown on drawings. Remove silt fences after slopes and ditches have been stabilized and turf developed to the extent that future erosion is unlikely. Dispose of materials remaining after removal.
- C. Inspect all silt fences immediately after each rainfall and at least daily. Correct deficiencies immediately. Where construction activity changes the earth contour and drainage runoff, make a daily review so that silt fences are properly located for effectiveness. Where deficiencies exist, install additional silt fences.
- D. Remove and dispose of sediment deposits. Sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade and the area topsoiled, fertilized, and seeded as required.

END OF SECTION

SECTION 31 32 19

GEOTEXTILES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Geotextiles for areas below structures.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 2–PRODUCTS

2.01 MATERIALS

- A. Geotextile for areas below structures shall be Mirafi 140N, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

- A. Geotextile shall be installed in accordance with manufacturer's recommendations.
- B. Geotextile shall be lapped a minimum of 24 inches.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Aggregate Base Course For Roads and Parking Areas.
 - 2. Gravel Roads.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall repair all roads, shoulders, and gravel areas damaged in accordance with this section. All paved areas shall also be repaired in accordance with Section 32 11 26–Hot Mix Asphalt Paving.

1.02 MEASUREMENT AND PAYMENT

- A. Repair or replacement of aggregate base course shall be considered incidental and included in the price Bid.

1.03 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications.

1.04 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

1.05 SUBMITTALS

- A. Submit sieve analysis for proposed materials in accordance with Section 01 33 00–Submittals.

1.06 DRAINAGE DURING CONSTRUCTION

- A. CONTRACTOR shall comply with the provisions of Article 280 of the Standard Specifications.

PART 2-PRODUCTS

2.01 AGGREGATES

- A. Aggregate for base course shall consist of crushed stone and shall meet the requirements of Article 351 of the Standard Specifications. The material furnished shall be uniformly graded and shall conform to ASTM C33.
- B. Base course shall be uniformly graded and shall conform to the requirements of No. CA-6.
- C. Material for top layer of shoulders shall meet the requirements of No. CA-4.

PART 3-EXECUTION

3.01 PREPARATION

- A. The subgrade shall be graded and rolled to provide uniform density and shall comply with the profile and cross sections contained in the Drawings. All street subgrade in cut areas and all areas to receive fill shall be proof-rolled in the presence of OWNER or ENGINEER with a heavily loaded triaxle dump truck or similar equipment prior to the placement of any fill materials or base course. The subgrade shall be prepared in accordance with Article 301 of the Standard Specifications.

3.02 CONSTRUCTION

- A. Base course grade shall be set to allow placement of thickness of asphaltic pavement shown or specified.
- B. Depth of base course shall be provided according to the standard cross sections or details provided on the Drawings.
- C. Base course shall be placed directly on subgrade areas or on top of salvaged asphalt millings unless otherwise indicated on the Drawings.
- D. Each layer of base course shall be wetted and rolled to provide maximum compaction in accordance with Article 351.05 of the Standard Specifications.
- E. The finished base course shall be fine graded in preparation for paving.
- F. After final grading, CONTRACTOR shall maintain the base course until asphaltic paving work has been completed.
- G. All gravel surfaces damaged during construction shall be replaced. The depth of aggregate shall match existing or 8 inches, whichever is greater.

END OF SECTION

SECTION 32 11 26

HOT MIX ASPHALT PAVING

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes Hot Mix Asphalt (HMA) Paving, Prime Coat, and Casting Adjustments.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall replace all roads, shoulders, and paved areas damaged during the project in accordance with this section. Gravel shoulders, gravel roads, and parking areas shall be repaired in accordance with Section 32 11 23–Aggregate Base Course.

1.02 MEASUREMENT AND PAYMENT

- A. Payment: Payment for HMA paving shall be considered incidental to the project and included in the Lump Sum Bid.

1.03 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications.

1.04 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

1.05 SUBMITTALS

- A. Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted to ENGINEER for approval in accordance with Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 HMA PAVEMENT

- A. HMA surface course shall be Mix “D,” N50, with a mix type of IL 9.5 mm and percent air voids of 4% at 50 gyrations. HMA binder course shall be IL 19.0 mm, N50, with percent air voids of 4% at 50 gyrations. HMA binder shall have a PG binder grade of PG 64-28. HMA surface course shall have a PG binder grade of SBS-PG-76-28.
- B. Aggregate shall conform to the requirements of Article 406.02 of the Standard Specifications.

- C. Where existing pavement is replaced, minimum pavement thickness shall be 4 inches or existing thickness, whichever is greater. Lower layer shall be 2 1/4 inches minimum. Upper layer shall be 1 3/4 inches minimum.
- D. Materials for prime coat shall conform to the requirements of Article 406.02.
- E. Pavement markings shall conform to Section 780 of the Standard Specifications for white markings, except without the reflective additive.

PART 3-EXECUTION

3.01 ALLOWABLE REMOVAL OF PAVEMENT

- A. CONTRACTOR shall remove asphalt pavement and road surface as a part of the general excavation. The width of pavement removed shall be the minimum possible and acceptable for convenient and safe installation of structures, utilities, and appurtenances.
- B. All asphalt pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the excavation. Should the cut edge be damaged, a new cut shall be made in neat, straight lines parallel to the original cut encompassing all damaged areas. Pavement removal shall be extended to a seam or joint if seam or joint is within 3 feet of damaged pavement.

3.02 CASTING ADJUSTMENTS

- A. All new and existing manhole castings and valve boxes within the paving limits of the street, which require adjustment, shall be adjusted to match the finished asphaltic surface. Adjustments shall not be made greater than 48 hours prior to the anticipated time of paving. Adjustments shall be performed as called for in Section 33 30 10-Buried Piping and Appurtenances. CONTRACTOR shall furnish Class 1 barricades with flashers on all adjusted castings until paving has been completed. Tops of castings and valve boxes shall be oiled or protected by other methods to prevent sealing of lids and filling of lift holes during paving. Upon completion of paving operations, CONTRACTOR shall check all castings and valve boxes to see that the lids are clean and operational. Manhole casting adjustment shall be included in the cost of other items of work, and no further compensation will be made. Valve box adjustment shall be considered an incidental item of work.

3.03 BITUMINOUS MATERIALS (TACK COAT AND PRIME COAT)

- A. All work shall be in accordance with the Standard Specifications, Article 406.05.
- B. If hot mix asphalt surface course is applied to an existing street or is not applied the same day as binder course, the existing street or binder surface shall be tack coated prior to surface paving. Prior to placement of tack coat, the streets shall be thoroughly cleaned and broomed according to Section 358 of the Standard Specifications. Tack coat shall be applied at a rate of 0.05 pound per square foot.
- C. In situations where traffic must be maintained, tack coat shall not be placed on the traveled half of the street until traffic can be switched to the new pavement.

- D. Aggregate bases shall have a layer of prime coat applied prior to paving the binder course. The prime coat shall be applied at the rate of 0.25 pound per square foot.

3.04 JOINTS

- A. Joints between old and new pavements or between successive day's work shall be constructed and treated to provide a thorough and continuous bond between the old and new mixtures. Transverse construction joints shall be constructed by cutting the material back for its full depth to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. These joints shall be treated with prime coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.
- B. The longitudinal joint shall be made by overlapping the screed on the previously laid material for a width of not more than 2 inches and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight. Longitudinal joints in the surface course shall at no time be placed immediately over similar joints in the binder course beneath. A minimum distance of 12 inches shall be permitted between the location of the joints in the binder course and the location of similar joints in the surface course above.
- C. All costs for furnishing and applying prime coat to butt joints as specified above shall be considered incidental.

3.05 FINISHING ROADWAY

- A. The finished base course shall be fine-graded in preparation for HMA paving. Base course ramps at all existing pavement shall be removed to provide a full depth butt joint. Base course around manhole castings and valve boxes shall be hand-trimmed and compacted with a vibratory plate compactor.
- B. This item shall include all of the following preparatory and finishing items and any other incidental items of work required for construction. Asphaltic ramps around manholes on existing binder course to receive surface course shall be removed. Asphaltic ramps shall be installed on all manholes and at all butt joints in areas to receive binder course only.
- C. Finishing roadway shall be considered incidental to HMA paving.
- D. Paint all markings to the width shown on drawings or with lines not less than 4 inches wide.

3.06 TESTING HOT MIX ASPHALT

- A. ENGINEER may require samples of HMA pavement for testing. CONTRACTOR shall cut samples from the finished pavement where marked by ENGINEER and patch the sample area. Samples for sieve analysis and asphalt content will be taken by ENGINEER prior to placement.

3.07 HOT MIX ASPHALT PAVING

- A. HMA paving work shall include the construction of plant-mixed hot mix asphalt pavement in the areas shown on the drawings. All work shall be performed in accordance with Section 406 of the Standard Specifications.
- B. Prior to commencement of paving operations, CONTRACTOR shall examine the finished road bed. CONTRACTOR shall notify ENGINEER of any areas of suspected instability.
- C. The pavement structure for streets, roadway, and parking lot construction shall be determined from the standard cross sections provided on the drawings.

END OF SECTION

SECTION 32 16 13

CONCRETE SIDEWALKS AND DRIVEWAY APRONS

PART 1—GENERAL

1.01 SUMMARY

- A. Work includes concrete sidewalks and driveway aprons as shown on the Drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 MEASUREMENT AND PAYMENT

- A. All costs of the Work shall be included in the Lump Sum Bid.

1.03 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications.
- B. AASHTO M148 Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.

1.04 QUALITY ASSURANCE

- A. Unless otherwise specified, all curb and gutter, sidewalks, and driveway apron construction shall meet the requirements of the Standard Specifications.

PART 2—PRODUCTS

2.01 CONCRETE

- A. All concrete shall be Class A or A-FA as specified in Section 03 30 00—Cast-In-Place Concrete.

2.02 CURING COMPOUND

- A. Liquid curing compounds shall conform to the requirements of the Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete, AASHTO Designation M148, Type 2, White Pigmented.

PART 3-EXECUTION

3.01 BASE PREPARATION-SIDEWALKS AND DRIVEWAYS

- A. The subgrade shall be thoroughly compacted and finished to a trim, firm surface. All soft or unsuitable material shall be removed and replaced with suitable material.
- B. A minimum 4-inch-thick layer of sand, sand and gravel, or base course shall be placed under all sidewalks. This material shall be thoroughly moistened and compacted before the concrete is placed.

3.02 FORMS

- A. Forms shall be of metal and of sufficient strength to resist distortion or displacement. Metal forms shall be used to construct a curb and gutter cross section. Forms shall be full depth of the required work. Facing boards, if used, shall be built so as to obtain the cross section called for on the Drawings. Forms shall be securely staked and held firmly to line and grade. Forms shall be cleaned thoroughly and oiled before reuse.

3.03 PLACING AND FINISHING CONCRETE

- A. Unless otherwise specified, concrete shall be placed in accordance with Section 03 30 00-Cast-In-Place Concrete.
- B. Concrete shall be thoroughly tamped to remove all voids. The exposed surfaces of the curb and gutter shall be thoroughly troweled and finished with a brush at right angles to the line of the curb and gutter. The back edge of the curb, the edge of the gutter adjacent to the pavements, and edges adjacent to expansion joints shall be rounded with a 1/4-inch-radius edger. Honeycombed areas along the back of the curb shall be pointed with mortar.
- C. Before final finishing of curb and gutter, a 10-foot straight edge shall be used to check the surface. Any areas showing a variation of more than 1/4 inch from the straight edge shall be corrected. Final finishing shall be delayed a sufficient time so that excess water and grout will not be brought to the surface.
- D. Concrete for sidewalk shall be placed to a minimum thickness of 5 inches, except at driveways and alleys, which shall have a minimum thickness equal to that of the driveway. Driveways shall have a minimum thickness of 8 inches. The concrete shall be thoroughly spaded and tamped to remove all voids. The surface of the driveway or sidewalk shall be thoroughly troweled and finished with a brush at right angles to the driveways or sidewalk line.

3.04 JOINTING-SIDEWALKS AND DRIVEWAYS

- A. Concrete sidewalk shall be cut into rectangular blocks approximately 5 feet long. The cut must extend at least one-fifth of the total thickness of concrete. The edges of the sidewalk along forms and joints shall be rounded with an edging tool of 1/4-inch radius. All joints shall be at right angles to the centerline of the sidewalk.
- B. Concrete driveways shall be jointed in approximately square sections. The depth of the joint and the finishing of the edges shall be the same as for concrete sidewalk.

3.05 EXPANSION JOINTS

- A. A 1-inch-thick expansion joint filler shall be placed between curb ramps and back of curb.
- B. A 3/4-inch-thick expansion joint shall be placed at all sidewalk corners, between sidewalks and buildings, and between back of curb and sidewalk.

3.06 SLOPE

- A. Sidewalk cross slope shall be 1/4 inch per foot unless otherwise noted in the Drawings or requested by ENGINEER.

3.07 CURB RAMP

- A. Curb ramps shall be constructed in accordance with Standard 424001-07/424006-01/424016-01/424021-02.

3.08 UTILITY MARKINGS

- A. The ends of utility service lines (sewer, water, and electrical conduits) shall be marked during installation. The curb top shall be marked immediately adjacent to these utility markers. Curb markers shall be 2 inches in height and shall consist of a "W" for water, "S" for sewer, and "E" for electric and blank conduits. Markings shall be embossed a minimum of 1/4 inch deep and be 3/8 inch thick. Utility markings shall be considered incidental work to curb and gutter.

3.09 CURING

- A. As soon after finishing operations as the free water has disappeared, the concrete surface shall be sealed by spraying on it a uniform coating of curing material in such a manner as to provide a continuous water impermeable film on the entire concrete surface.
- B. The material shall be applied to form a uniform coverage at the rate of not less than one-half gallon per 100 square feet of surface area.
- C. Within 30 minutes after the forms have been removed, the edges of the concrete shall be coated with the curing compound applied at the same rate as on the finished surface.

3.10 PROTECTION OF CONCRETE

- A. CONTRACTOR shall erect and maintain suitable barricades to protect the new concrete. Where it is necessary to provide for pedestrian traffic, CONTRACTOR shall, at their own cost, construct adequate crossings. Crossing construction shall be such that no load is transmitted to the new concrete.
- B. Any part of the work damaged or vandalized prior to final acceptance shall be repaired or replaced at the expense of CONTRACTOR in a manner satisfactory to ENGINEER.
- C. Pedestrian traffic shall not be permitted over new concrete prior to 72 hours after application of curing material. Vehicular traffic shall not be permitted over newly placed concrete within 7 days after completion when temperatures are 70°F or higher, 10 days when temperatures are not lower than 60°F and up to a maximum of 21 days when the temperatures are generally lower than 60°F.

3.11 CONCRETE TESTING

- A. Concrete testing shall be in accordance with Section 03 30 00—Cast-In-Place Concrete.

END OF SECTION

SECTION 32 31 11
FENCE GATE OPERATOR

PART 1–GENERAL

1.01 SUMMARY

- A. Furnish and install a fence gate operator system as described herein and shown on the Drawings. System shall include all necessary control boards, power supplies, loop detectors, connectors and accessories for a complete and operational system. System shall be fully compatible with the gates specified in Section 32 31 19–Steel Ornamental Fence System.
- B. Related Sections and Divisions:
 - 1. Applicable Provisions of Division 01 shall govern Work in this section.
 - 2. Section 28 10 00–Access Control System.

1.02 REFERENCES

- A. ASTM F2200–Standard Specification for Automated Vehicular Gate Construction.
- B. UL 325–Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.03 QUALITY ASSURANCE

- A. Installation shall comply with all applicable codes.
- B. All equipment shall be new, in current production, and the standard products of a manufacturer of vehicular gate operator equipment.
- C. Manufacturer shall demonstrate features, functions, and operating characteristics.
- D. System shall be installed by a factory authorized CONTRACTOR with technicians trained in this system.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01 33 00–Submittals.
- B. Submittals shall include an equipment list, datasheet(s), system description, block diagrams on equipment to be furnished, manufacturer's instructions, and electrical wiring diagrams for installation.
- C. Submittals shall include all data necessary to evaluate design, quality, and configuration of proposed equipment and system(s).

1.05 WARRANTY

- A. Gate operator shall be provided with a minimum 5-year warranty.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 MANUFACTURER

- A. The Drawings and Specifications were prepared based on Ameristar Gate Systems. CONTRACTOR shall include in the Bid, and shall be responsible for, the cost of any changes to accommodate other equipment, including, but not limited to, structural and electrical work. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 FENCE GATE OPERATOR

- A. The fence gate operator shall use a microprocessor based solid-state control board that controls the functions of the fence gate operator. Operator shall be rated for continuous duty for use in commercial and industrial applications. Operator shall include the following features/functions as a minimum:
 - 1. Auto-close on/off selection with adjustable auto-close timer.
 - 2. Fail-secure on/off selection.
 - 3. Equipped with ports for plug-in loop detectors.
 - 4. Dry contacts rated for 1A at 120 VAC each to indicate gate is in the fully closed and fully open positions.
- B. A primary reduction system shall use an adjustable clutch and power transfer shall be provided by a single cog belt drive train.
- C. Fence gate operator shall use magnetic sensing to set open and close limit adjustments. Mechanical type limit switches will not be allowed.

- D. Fence gate operator shall automatically set both open and close limit adjustments upon power up and activation in the open direction. Operator shall automatically sense gate coasting.
- E. A pulling medium shall provide a positive mechanical connection to the gate system. Friction driven rail-type pulling mediums will not be allowed. A positive dead bolt shall activate only when the gate is forced open. Chain shall be minimum No. 40 nickel plated. Provide chain tray for gates longer than 20 feet.
- F. Primary and secondary entrapment detection shall be utilized to prevent persons from becoming entrapped in the gate system. Entrapment detection sensors shall automatically cause the gate operator to stop and reverse if an obstruction is sensed during the open or close cycle.
- G. Fence gate operator shall be capable of being mounted at the front, center, or rear of the gate system, shall be designed for either left- or right-hand mountings, and shall be designed for pad or post mounting.
- H. Fence gate operator frame shall be minimum 12 gauge G90 galvanized steel and shall be painted charcoal gray.
- I. Fence gate operator shall be 1/2 hp, 1,000 lb maximum gate weight, 30-foot maximum gate length, 230 VAC single-phase for the West Receiving Station and 460 VAC single-phase for the East Receiving Station, with approximately 10-in/sec gate speed. Fence gate operator shall have two 115 VAC convenience outlets available for accessory transformer power and shall have a built-in lockable on/off switch and reset switch.
- J. Fence gate operator shall include gate control board with the following features/functions:
 - 1. Connections for optional system that tracks gate operations.
 - 2. Allows a stop or stop and reverse function (settable) from the access control system.
 - 3. Two ports for connection of plug-in vehicular loop detectors.
 - 4. One set of dry normally-open/normally-closed auxiliary contacts shall be available for external use.
 - 5. Separate inputs for external contact and noncontact entrapment protection devices.
 - 6. Functions shall be user programmable by DIP switches located on the control board. Provide NEMA 4X enclosure for control boards.
- K. Vehicle loop detectors shall consist of plug-in modules that connect to the gate operation control board, loop lead-in cables, and underground loop wire. Fence gate operator shall include vehicle loop detectors with the following features/functions:
 - 1. Diagnostic LEDs for monitoring operation of the physical loop system and terminal strips for connection of loop lead-in cables.
 - 2. Loop lead-in cable shall be shielded twisted pair installed in accordance with manufacturer's recommendations.
 - 3. Underground loop shall be made from a continuous loop wire without splices, coiled for number of turns recommended by manufacturer. Underground loop wire shall be 18 AWG cross linked XLPE-insulated wire installed in accordance with manufacturer's recommendations.
 - 4. Single or dual channel loop detectors as required to provide reverse and exit loops as shown on the Drawings.
 - 5. Loop detectors shall be Ameristar Gate Systems, part numbers 9409, or equal.

- L. Fence gate operation shall be fail-safe.
- M. Provide heater kit by DoorKing, part number 1601-154, or equal.
- N. Provide a keyed two-position selector switch to enable/disable gate operation. Keyed switch shall be DoorKing, part number 1206, or equal.
- O. Fence gate operator system shall be manufactured by Ameristar Gate Systems, model 9150AGS, or equal.

2.03 GATE CONTROL ACCESSORIES

- A. Entrapment protection devices.
 - 1. Include noncontact, electronic obstruction sensors and contact sensors as required to meet UL 325 safety standards. Sensing devices shall be monitored by the fence gate operator.
 - 2. Sensing edges by MillerEdge, part number MGS20, or equal.
 - 3. Photoeye by EMX, part number IRB-MON, or equal. Photoeye shall include powder coated steel protective hood, part number IRB-SH-SET, and water-tight strain relief, part number IRB-SP.
 - 4. Pedestals shall be dual height and shall be 42 inches tall to lower mounting plate, 72 inches tall to upper mounting plate. Dual height pedestals shall be DoorKing, part number 1200-049, or equal. Provide weatherproof housing for all pedestal-mounted access control devices.
- B. Provide a fire department lock box to override the access control system and allow emergency personnel access to the site. Lock box shall be DoorKing, part number 1401, or equal.

PART 3—EXECUTION

3.01 GATE CONTROLS

- A. Fence gate operators shall be controlled by the sources specified to be provided in Section 28 10 00—Access Control System, exit loop, and entrapment detection devices as follows:
 - 1. Gate operator shall open when a dry-contact input is received from the access control system or fire department lock box switch.
 - 2. When the exit loop detects a vehicle is present, the gate shall automatically open. Gate shall remain open until the outside reversing loop detects that the vehicle has cleared the gate closure area and the gate close timer (0 to 90 seconds) has timed out.
 - 3. Gate operator audible alarm shall annunciate for 30 seconds prior to gate opening and during gate travel.
 - 4. Gate operator device shall be equipped with a photoeye and sensing edges to detect obstructions. If the photoeye or sensing edge senses an obstruction in the gate closure path, an audible alarm shall sound and the gate shall remain open for an adjustable timer (0 to 90 seconds) before trying to close again. If obstruction is still present, the gate shall cycle through the timer again.

3.02 INSTALLATION

- A. Controls intended for user activation must be located at least 10 feet away from any moving part of the gate and where the user is prevented from reaching over, under, around, or through the gate to operate the controls.
- B. Physical gate stops shall be installed to stop the gate in the open and closed positions before installation of the fence gate operator.
- C. Provide all devices required to regulation UL 325 Class III entrapment protection even if these devices are not specifically identified on the Drawings.
- D. Fence gate operator and gate control system shall in accordance with manufacturer's recommendations and be installed by a qualified technician.
- E. CONTRACTOR shall provide all conduits, junction boxes, pull boxes, and other enclosures as required. Furnish and install all wiring for fence gate operator and all gate control system appurtenances in accordance with manufacturer's recommendations. Conduit protruding from poured concrete or soil shall be PVC coated rigid in accordance with Section 26 05 33—Conduit. Junction and pull boxes exposed to weather shall be stainless steel. All flexible conduit shall be liquid-tight in accordance with Section 26 05 33—Conduit.
- F. It is understood that this work shall include initial tests and adjustments necessary to establish and modify performance of the fence gate operator and gate control system as required to provide adequate site security.
- G. Gate operator shall be installed on a concrete pad in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCE

PART 1–GENERAL

1.01 SUMMARY

- A. Work includes providing all chain link fencing and gates complete, as shown on the Drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. ASTM A121–Zinc-Coated (Galvanized) Steel Barbed Wire.
- B. ASTM A121–Metallic Coated Steel Barbed Wire.
- C. ASTM A392–Zinc-Coated Steel Chain-Link Fence Fabric.
- D. ASTM A428–Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- E. ASTM A491–Aluminum-Coated Steel Chain Link Fence Fabric.
- F. ASTM A1011–Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- G. ASTM F567–Installation of Chain-Link Fence.
- H. ASTM F626–Fence Fittings.
- I. ASTM F900–Industrial and Commercial Swing Gates.
- J. ASTM F1043–Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
- K. Chain Link Fence Manufacturers’ Institute (CLFMI)–Product Manual.

1.03 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product’s value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 POSTS, RAILS, AND BRACES

- A. Construction:
1. All posts and rails shall be either tubular pipe conforming to ASTM F1043 Group 1A, Schedule 40 with black powdercoating.
 2. Post sizes shall be in accordance with the following:

LINE POSTS (MAXIMUM 10 FEET SPACING)

Height and Fence Type	Post Type	O.D. (IN.)	Weight (PLF)
6 feet or less	Group 1A	1.90	2.72
Up to 8 feet	Group 1A	2.375	3.65

CORNER AND BRACE POSTS

Height and Fence Type	Post Type	O.D. (IN.)	Weight (PLF)
7 feet or less	Group 1A	2.375	3.65
8 feet or 10 feet without wind screen, hardware cloth or privacy inserts	Group 1A	2.875	5.79

3. Gate posts shall conform to manufacturer's specifications for various width gates. Minimum sizes shall be as follows:

GATE POSTS

Leaf Width	Post Type	O.D. (IN.)	Weight (PLF)
6 feet or less	Group 1A	2.875	5.79
7 feet to 13 feet	Group 1A	4.0	9.10
14 feet to 18 feet	Group 1A	6.625	18.97

4. Terminal posts shall be braced with the same material as top rail and trussed to line posts with 3/8-inch-diameter rods and tightened. One brace assembly shall be provided with each end or gate post and two assemblies with each corner or pull post.

5. Rails shall be 1 5/8 inch OD Group 1A 2.27 pound per foot or Group 1C 1.84 pounds per foot pipe.
- B. Line Posts: Line posts may be driven posts.
- C. Required Arms, Rails, and Tension Wires: Provide rampart arm, top rail, and bottom tension wire.

2.02 FABRIC

- A. Construction:
 1. Fabric to be No. 9 gauge steel aluminum-coated steel wire woven in a 2-inch mesh with black powdercoating; top selvage to have knuckled finish, bottom selvage to be knuckled.
 2. Fabric height shall be 6 feet.
 3. The designated height of the fence shall be the fabric height.
 4. Fasteners:
 - a. Fasteners shall be galvanized steel wire clips and tie wires in accordance with ASTM A-641 Class III or aluminum coat in conformance with fence fabric specifications.
 - b. Provide fasteners for posts, top and intermediate rails, bottom rails, top tension wires, and braces of 9 gauge steel or 0.179-inch-diameter aluminum tie wires.
 - c. Provide fasteners for bottom tension wire of not smaller than 12 gauge, or 0.149-inch-diameter aluminum tie wires.

2.03 GATES

- A. General:
 1. Provide additional horizontal and vertical members as necessary to provide proper gate operation and attachment to fabric and hardware.
 2. Provide diagonal braces made of crossed adjustable length 3/8-inch-diameter truss rods on nonwelded gate frames and on welded frames where corner rigidity is not sufficient to prevent sag.
 3. Gate frames shall be covered with the same fabric as the fence.
 4. Weld or assemble gate frames with malleable or pressed steel fittings and rivets to provide rigid connections. Install fabric with stretcher bars at vertical edges. Attach to frame at 15 inches o.c. all sides. Provide caps for all gate frame work ends.
- B. Gate Hardware:
 1. Provide center stop and keeper for all double-leaf gates. Provide spring latch for all sliding gates. Provide padlock eye as an integral part of all latches.
 2. Provide heavy-duty track, ball bearing hanger sheaves framing and supports, guides, stays stops, and bracing necessary for sliding gates.

2.04 ACCESSORIES

- A. General: All accessories, except tie wires and barbed wire, shall be galvanized to comply with ASTM F626.

- B. Post Tops:
 - 1. Material shall be pressed steel or malleable iron.
 - 2. Top shall be weathertight.
 - 3. Top shall permit passage of top rail.
- C. Stretcher Bars:
 - 1. Stretcher bars required for tubular end, corner, pull, or gate posts.
 - 2. Bars shall be one-piece lengths equal to full height of fabric with minimum cross section of 3/16 inch by 3/4 inch.
 - 3. Provide one stretcher bar for each gate and end post and two stretcher bars for each corner and pull post.
- D. Stretcher Bar Bands:
 - 1. Material shall be heavy pressed steel.
 - 2. Spacing shall be 15 inches maximum o.c. to secure stretcher bar to tubular end, corner, pull, and gate post.
- E. Tension Wire: 7 gauge steel wire with black powdercoating.
- F. Ground Rods: Provide a 1/2-inch-diameter 6-foot-long copper clad rod to provide a ground. Provide one for each 1,000 feet of fence and one for each separated fence section.

2.05 CONCRETE

- A. Concrete shall be Type A or A-FA, as specified in Section 03 30 00—Cast-In-Place Concrete.

PART 3—EXECUTION

3.01 SITE WORK

- A. Prior to fence construction, remove and dispose of all trees, brush, logs, stumps, and other debris for a width of at least 12 inches each side of the proposed fence alignment.

3.02 CONCRETE FOOTINGS

- A. Excavate holes for footings to neat dimensions in firm ground so that the post will be centered. Remove rock or other obstructions encountered to the required depth. Use forms in unstable soil, and allow them to remain in place for at least 24 hours after concrete is poured. Backfill, after forms are removed, with suitable material thoroughly compacted in place in layers to prevent settlement.
- B. Footings shall be 36 inches deep and 10 inches minimum diameter. The bottom of the post shall be 3 inches above the bottom of the hole. Corner, gate, and end post bases shall be 12 inches minimum diameter. Gate posts larger than 4 inches o.d. shall have a base with a minimum diameter of 18 inches. Concrete bases shall be domed at the post and have a smooth troweled finish. Concrete footings shall cure for seven days before placing tension wires.

3.03 POSTS AND BRACES

- A. Set posts in a vertical position at the required location and alignment. Set tops at the required elevation to provide a smooth profile at the top rail or tension wire without abrupt changes and in conformity with the general contour.
- B. Place an end post at each end of each run of fence. Place a corner post whenever a break of 30 degrees or more occurs in the horizontal alignment. Set an intersection post in line with an intersecting chain link fence and brace it to the adjacent posts of the intersecting fence.
- C. Place an intermediate-braced post where the vertical alignment changes by more than 5 degrees, or a change in fence grade of more than 9% occurs.
- D. Place an intermediate braced post at 660-foot intervals for fence with a top rail and at 1,000-foot intervals for fence with a top tension wire on all long runs of fence. Set an intermediate brace post at the approximate midpoint when runs of fence are less than 1,320 feet but more than 660 feet for fence with top rail, or less than 2,000 feet but more than 1,000 feet for fence with top tension wire.

3.04 POST BRACING ASSEMBLY

- A. Post bracing assemblies consist of one or more brace rails and a 3/8-inch truss rod as hereafter specified. Provide brace rails the same size as the top rail. Provide truss rods with an adjustable take-up adapter.
- B. Install a single bracing assembly at each gate and end post location.
- C. Install a double bracing assembly at each corner post and all intermediate braced posts.
- D. Provide the bracing assembly with one horizontal brace rail and one diagonal truss rod on all fences which have a top rail. Locate the horizontal brace rail in accordance with the manufacturer's specifications.
- E. Provide the bracing assembly with one horizontal brace rail and one diagonal brace rail and one diagonal truss rod on all fences which do not have a top rail. Locate the horizontal rail in accordance with the manufacturer's specifications.

3.05 STRETCHER BARS

- A. Provide one stretcher bar for each gate and end post and two for each corner and pull post, except roll form posts with integral loops. Attach to posts with heavy-duty pressed steel or malleable iron bands spaced at 15 inches o.c.

3.06 GROUND RODS

- A. Connect at least three fence wires to the ground rod by clamping, bolting, or brazing. Ground rod shall be installed on line with fence.
- B. Where required, install ground rods as specified for each run of fence, and install additional rods for each 1,000 feet on long runs of fence.

3.07 FABRIC

- A. Install, stretch, and anchor tension wires to each end, corner, gate, and brace post and properly attach to each line post before the fabric is placed. Pass top tension wire (when required) through the post top rail opening. Install top rails at proper locations.
- B. Attach the end of the fabric to the end, corner, gate, or brace posts (except roll form posts with integral loops) by means of a stretcher bar threaded through the end loops of the fabric and stretched to remove all slack with proper stretching equipment. Secure the stretched fabric to posts, rails, and tension wires with specified fabric fasteners. Install fabric fasteners on all posts at not greater than 14 inches o.c. and on rails and bottom tension wires at not more than 24 inches o.c. Where a top tension wire is installed, fasten to the fabric at not more than 18 inches o.c.
- C. Repeat stretching operations at approximately every 100 feet for each run of fence.
- D. Make splices in fabric by interweaving a wire picket through each end loop of each piece of fabric. Each splice shall be subject to ENGINEER's review.

3.08 GRADE CLEARANCE

- A. For line and property fences, provide a clearance of 3 inches.

3.09 GATES

- A. Install gates plumb and level and adjust for smooth operation as intended without binding or hanging up.

3.10 BARBED WIRE

- A. Install barbed wire properly fastened to the rampart arms.

3.11 CLEANUP

- A. After chain link fence construction is completed, clean up all storage and work areas. Replace or repair, as required, all landscape features damaged or disturbed under this Contract.

END OF SECTION

SECTION 32 31 16
STEEL ROLL GATE SYSTEM

PART 1—GENERAL

1.01 WORK INCLUDED

- A. CONTRACTOR shall provide all labor, materials, and appurtenances necessary for installation of the steel roll gate system defined herein that is compatible with the Steel Ornamental fence system specified in Section 32 31 19—Steel Ornamental Fence System and as shown on the drawings.

1.02 SYSTEM DESCRIPTION

- A. CONTRACTOR shall provide a total roll gate system of ornamental design series and majestic style. The system shall include all components, (i.e., pickets, rails, gate uprights, wheels, and hardware) required.

1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.04 REFERENCES

- A. ASTM B117—Practice for Operating Salt-Spray (Fog) Apparatus.
- B. ASTM D523—Test Method for Specular Gloss.
- C. ASTM D714—Test Method for Evaluating Degree of Blistering in Paint.
- D. ASTM D822—Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- E. ASTM D1654—Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- F. ASTM D2244—Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794—Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- H. ASTM D3359—Test Method for Measuring Adhesion by Tape Test.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01 33 00—Submittals.

- B. Submittals shall include all data necessary to evaluate design, quality, and configuration of proposed equipment and system(s).

1.06 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be observed to see that no damages occurred during shipping or handling. Materials shall be stored in such a manner to provide proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

1.07 WARRANTY

- A. All structural fence components, (i.e., rails, pickets, and posts) shall be warranted for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering, or corroding.
- B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer's warranty shall be guaranteed for five years from date of original purchase.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2—PRODUCTS

2.01 MANUFACTURERS

- A. The steel roll gate system shall be Ameristar PassPort Commercial Ornamental design series, majestic style and three-rail frame configuration by Ameristar Fence Products, Inc. in Tulsa, Oklahoma, or equal.

2.02 MATERIAL

- A. Steel material for roll gate components, (i.e. pickets, rails, diagonals and uprights), shall be commercial steel with a minimum yield strength of 45,000 psi (344 MPa).
- B. Ornamental picket material shall be 3/4-inch-square by 14-gauge tubing. Picket spacing shall be 4 5/8 inches. Material for top rails, uprights, and diagonals rails shall be

2-inch-square by 12-gauge. Material for the bottom rail shall be 2-inch by 4-inch by 11 gauge. Posts shall be a minimum of 4-inch-square by 11 gauge.

2.03 FABRICATION

- A. Pickets, rails, uprights and posts shall be precut to specified lengths. Diagonals shall be precut to specified lengths and angles. Frame materials shall be joined by welding. Pickets shall be face welded to roll gate frame, except for Invincible gates over 18 feet long. Invincible-style gates over 18 feet long shall have pickets face-welded to 2-inch by 2-inch angle iron to form panels equal in length to the gate frame bay width.
- B. Manufactured roll gates and bolt-on panels (if applicable) shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pre-treatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. Base coat shall be a thermosetting epoxy powder-coating (gray in color) with a minimum thickness of 2 mils (0.0508 mm). The topcoat shall be a “no-mar” TGIC polyester powder-coat finish with a minimum thickness of 2 mils (0.0508 mm). The color shall be (specify Black, Bronze, White, or Black Desert Sand). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.
- C. Completed gates shall be capable of supporting a 200 lb. load applied at midspan without permanent deformation.

PART 3—EXECUTION

3.01 PREPARATION

- A. All new installation shall be laid out by CONTRACTOR in accordance with the construction Drawings.

3.02 INSTALLATION

- A. Gateposts shall be set in accordance with the spacings shown in the Drawings. “Earthwork” and “Concrete” sections of this Specification shall govern post base material requirements. Six-inch wheels shall be bolted to the gate (between the wheel plates welded near the ends of the gate bottom rail). Gate shall be set upright with the V-grooved wheels positioned over the pre-installed steel V-track that traverses the gate opening. V-track is to be installed level to prevent gravity from causing the gate to roll freely. Roller guides shall be affixed to the gateposts at a height even with the gate top rail to hold the gate in a vertical position. Gate stop options shall either be welded to the top end of the gate and guideposts, track, or separate post set at each end of the gate in the full open or closed position, so gate cannot pass rollers in either direction.

3.03 CLEANING

- A. CONTRACTOR shall clean the jobsite of excess materials; post hole excavations shall be scattered uniformly away from posts.

Table 1–Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359–Method B	Adhesion (Retention of Coating) over 90% of test area (tape and knife test).
Corrosion Resistance	B117, D714, and D1654	Corrosion Resistance over 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/8-inch coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch-lb. (Forward impact using 0.625-inch ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

END OF SECTION

SECTION 32 31 19

STEEL ORNAMENTAL FENCE SYSTEM

PART 1—GENERAL

1.01 WORK INCLUDED

- A. CONTRACTOR shall provide all labor, materials, and appurtenances necessary for installation of the welded ornamental steel fence system defined herein.

1.02 SYSTEM DESCRIPTION

- A. Manufacturer shall supply a total fence system of ornamental steel design. The system shall include all components (i.e., panels, posts, gates, and hardware) required.

1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.04 REFERENCES

- A. ASTM A653/A653M—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM B117—Practice for Operating Salt-Spray (Fog) Apparatus.
- C. ASTM D523—Test Method for Specular Gloss
- D. ASTM D714—Test Method for Evaluating Degree of Blistering in Paint.
- E. ASTM D822—Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- F. ASTM D1654—Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- G. ASTM D2244—Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- H. ASTM D2794—Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- I. ASTM D3359—Test Method for Measuring Adhesion by Tape Test.
- J. ASTM F2408—Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01 33 00–Submittals.
- B. Submittals shall include all data necessary to evaluate design, quality, and configuration of proposed equipment and system(s).

1.06 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be observed to see that no damage occurred during shipping or handling. Materials shall be stored in such a manner to provide proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

1.07 WARRANTY

- A. All structural fence components (i.e., rails, pickets, and posts) shall be warranted within specified limitations by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering, or corroding.
- B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer's warranty shall be guaranteed for five years from date of original purchase.

1.08 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MANUFACTURERS

- A. The fence system shall conform to Montage Plus standard picket, Ornamental Steel, Majestic, design, extended picket bottom rail treatment, two-rail, style manufactured by Ameristar Fence Products, Inc., of Tulsa, Oklahoma, or equal.

2.02 MATERIAL

- A. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft² (184 g/m²), Coating Designation G-60.
- B. Material for pickets shall be 3/4-inch square by 18-gauge tubing. Rails shall be steel channel, 1.5-inch by 1.4375-inch by 14 gauge. Picket holes in the rail shall be spaced 4.675 inches o.c. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.03 FABRICATION

- A. Pickets, rails, and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.
- B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar's proprietary fusion welding process, thus completing the rigid panel assembly
- C. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash, followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be black The coated panels and posts shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2 (Note: The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408).
- D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for commercial weight fences under ASTM F2408.
- E. Gates with an out-to-out leaf dimension less than and including 72 inches shall be fabricated using Montage Plus ornamental panel material and 1 3/4-inch sq. by 14 gauge gate ends. Gate leaves greater than 72 inches shall be fabricated using ForeRunner rails, 17 gauge pickets, intermediate uprights, gussets and 1 3/4-inch sq. by 14 gauge gate ends. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.
- F. Classic, Majestic, Genesis, and Warrior styles with 3- and 4-rail configurations shall meet International Building Code compliance. Panel, post and bracket assemblies shall be subjected to structural performance testing according to Chapter 17–Structural Tests and Special Inspections–International Building Code (IBC) 2018. Physical testing to be completed by an accredited third party testing facility. Completed assembly shall demonstrate a loading capacity of 2.5 times the prescribed design loads found in Section 1607.8.1, 1607.8.1.1 and 1607.8.1.2 of IBC 2018 for Handrails and Guards. IBC-compliant fence system requirements detailed within Table 4.

PART 3-EXECUTION

3.01 PREPARATION

- A. All new installation shall be laid out by CONTRACTOR in accordance with the construction Drawings.

3.02 INSTALLATION

- A. Fence posts shall be spaced according to Table 3, plus or minus 1/4-inch. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36 inches (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods, such as plated posts or grouted core-drilled footers, are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.03 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts, adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area; 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole and let dry; 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces in accordance with steps 1 through 3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION

- A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. Manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacturer of the gate and shall be installed in accordance with the manufacturer's recommendations.

3.05 CLEANING

- A. CONTRACTOR shall clean the jobsite of excess materials. post-hole excavations shall be scattered uniformly away from posts.

Table 1–Minimum Sizes for Posts		
<u>Fence Posts</u>	<u>Panel Height</u>	
2-1/2" x 16 Ga.	Up to & Including 6' Height	
<u>Gate Leaf</u>	<u>Gate Height</u>	
	<u>Up to & Including 4'</u>	<u>Over 4' Up to & Including 6'</u>
Up to 4'	2-1/2" x 14 Ga.	3" x 12 Ga.
4'1" to 6'	3" x 12 Ga.	3" x 12 Ga.
6'1" to 10'	3" x 12 Ga.	4" x 12 Ga.
10'1" to 16'	6" x 3/16" wall	6" x 3/16" wall

Table 2–Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359–Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

Table 3–Post Spacing By Bracket Type						
Span	For 8' Nominal (91.95" Rail)					
Post Size	2-1/2"	2-1/2"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Montage Plus Universal (BB112)	Montage Plus Line Blvd. (BB114)	Montage Plus Flat Mount (BB111)		Montage Plus Swivel (BB113)*	
Post Settings ± 1/4" O.C.	95"	95"	95"	95-1/2"	*95"	*95-1/2"
*Note: When using BB113 swivel brackets on either or both ends of a panel installation, care must be taken so that the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.						

Table 4–Montage Plus–IBC-Compliant System Requirements				
Panel Options		Post Options		Brackets Options
Styles	Rail Configuration	Steel Post Options	Post Plate Options (Anchorage by Others)	Line Boulevard Brackets
Classic	3-rail and 4-rail	2.5" SQ x 14 ga.	8" x 8" x 3/8" for 2.5" posts	End Boulevard Brackets
Majestic		3" SQ x 12 ga.	10" x 10" x 3/8" for 3" posts	Corner Boulevard Brackets
Genesis		4" SQ x 12 ga.		Flat Mount Brackets*
Warrior				<i>Note Flat Mount Brackets require a thru-bolt installation</i>
Panel, post, and bracket assemblies shall be subjected to structural performance testing according to Chapter 17–Structural Tests and Special Inspection–IBC 2018. Physical testing to be completed by accredited third party testing facility. Completed assembly shall demonstrate.				

END OF SECTION

SECTION 32 92 19

SEEDING AND SODDING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Preparation Of Subsoil.
 - 2. Placing Topsoil.
 - 3. Seeding, Sodding, Mulching and Fertilizing.
 - 4. Maintenance.
- B. Except for paved, riprapped, or built-up areas, all areas of the site which are disturbed and areas noted on the Drawings shall be seeded or sodded. Surfaces on 3-to-1 slope or less may either be seeded or sodded, but surfaces on greater than 3-to-1 slope shall be sodded.
- C. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. FS O-F-241—Fertilizers, Mixed, Commercial.
- B. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications.

1.03 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Sod: Minimum age of 18 months, with root development that will support its own weight without tearing when suspended vertically by holding the upper two corners. Submit sod certification for grass species and location of sod source.

1.04 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver sod on pallets or in rolls. Protect exposed roots from dehydration. Do not deliver more sod than can be laid within 24 hours.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2–PRODUCTS

2.01 SEED MIXTURE

- A. Seed Mix Class 1–Lawn Mixture per Standard Specifications. Use blue tag certified seed. Do NOT use bent or Poa Annua. Each seed lot will be subject to sampling and testing by the State seed laboratory.
- B. Weed content shall not exceed 0.5% in mixture.

2.02 SOD

- A. Follow Section 252 of the Standard Specifications.
- B. Erosion control blanket or turf reinforcement shall be in accordance with Section 251.05 of the Standard Specifications.
- C. Anchorage staples shall be in accordance with Section 252.07 of the Standard Specifications.

2.03 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds, roots and rocks; pH value of minimum 5.4 and maximum 7.0.
- B. Topsoil from the site may be used if it meets the above requirements. Additional topsoil shall be provided as required by Drawings and Specifications.

2.04 ACCESSORIES

- A. Mulching material shall be oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer shall be FS O-F-241, Type I, Grade A; recommended for grass, with 50% of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions: Nitrogen 10%, phosphoric acid 10%, soluble potash 10%. Submit composition deviations to suit site conditions for ENGINEER's review.
- C. Water shall be clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

PART 3–EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil in accordance with local, state, and federal regulations.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat deep (> 12 inches) subsoiling or cultivation in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 6 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign nonorganic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to provide positive drainage.
- E. Manually spread topsoil around trees, plants, and buildings to prevent damage.
- F. Leave stockpile area and site clean and raked, ready to receive landscaping.
- G. Engineered topsoil placement of 24 inches by CONTRACTOR is required within bioretention basin areas except as noted otherwise.

3.04 FERTILIZING

- A. Apply fertilizer at a rate of 17 pounds per 1,000 square feet.
- B. Apply after smooth raking of topsoil and prior to installation of seed or sod, no more than 18 hours before seeding or 48 hours before sodding.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.05 SEEDING

- A. Apply seed at a total rate of 3 1/2 pounds per 1,000 square feet. Apply evenly in two intersecting directions. Rake in lightly or roll the seeded area after seeding.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting season shall be between April 15 and June 15, or between August 15 and October 15.

- D. Do not sow immediately following rain, when ground is too dry or during windy periods.
- E. Immediately following seeding, apply mulch:
 - 1. Minimum Spread Rate: 1 1/2 tons per acre.
 - 2. Maximum Depth: 1 1/2 inches to 2 inches.
- F. Apply water with a fine spray immediately after each area has been mulched and on a daily basis to keep straw in place.
- G. Seeding shall be maintained by CONTRACTOR until grass is well established. Grass is well established when it covers the entire seeded areas to a height of 2 inches.
- H. Place erosion control mats per Section 31 25 00–Slope Protection and Erosion Control.

3.06 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately after delivery to site to prevent deterioration.
- C. Lay sod tight with no open joints visible and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Align with adjoining grass areas.
- E. Place bottom elevation of sod 1 inch below top of adjoining edging, paving, or curbs.
- F. On slopes 4-to-1 and steeper, sod will be secured with wooden pegs at a maximum of 24 inches on center.
- G. On slopes 2-to-1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- H. All sod placed in ditches, flumes, or other appurtenances where a concentrated flow of water may be expected shall be staked regardless of the slope.
- I. Water sodded areas immediately after installation. Saturate sod to 4-inch depth of soil.

3.07 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2 1/2 inches. Do not cut more than one-third of grass blade at any one mowing.
- B. Immediately remove clippings after mowing.
- C. Water to prevent grass and soil from drying out.
- D. Roll surface to remove minor depressions or irregularities.
- E. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

- F. Immediately reseed areas which fail to show adequate catch. Bare spots shall not exceed 5 square feet in area and not exceed 3% of the total seeded areas. Immediately replace sod in areas which show bare spots or deterioration.
- G. Protect seeded areas with warning signs during maintenance period.
- H. Immediately reseed areas which do not show a satisfactory stand of established grass, and resod areas that do not show satisfactory establishment.
- I. Correct damage resulting from erosion, gullies, rills, or other causes by filling with topsoil, tamping, refertilizing, and reseeding if damage occurs prior to acceptance of work.
- J. Maintain seeded lawns for not less than 60 days after substantial completion.
- K. If seeded in fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable lawn is established.
- L. Maintain sodded lawns for not less than 30 days after substantial completion.
- M. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth acceptable lawn free of eroded or bare areas.

END OF SECTION

SECTION 32 94 00

TREES, PLANTS, STONE MULCH, AND EDGING

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Trees and Plants.
 - 2. Hardwood Mulch.
 - 3. Stone Mulch.
 - 4. Plastic and Aluminum Edging.
 - 5. Maintenance.
 - 6. Tree Pruning.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with 3 years' experience. Plant materials shall be free of disease and hazardous insects.
- B. Installer Qualifications: Company specializing in installing and planting the plants with 3 years' experience.
- C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.

1.03 WARRANTY

- A. All plant material is to be fully guaranteed throughout the correction period. Only those plants that are alive and normally healthy for the first year will be accepted. Unaccepted material shall be removed and replaced by CONTRACTOR at no cost to OWNER during the next suitable growing season.
- B. Replacement plants shall be the same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2—PRODUCTS

2.01 PLANT MATERIALS

- A. All plant materials shall conform to American Standard for Nursery Stock (current edition). Plants shall be true to species and variety specified and nursery grown in accordance with good horticultural practices.

- B. Plant Materials: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the project for at least 2 years.
- C. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged, cut, or crooked leader, included bark, abrasion of bark, sunscald, disfiguring knots, insect damage, mold, or prematurely opened buds are cause for rejection.

2.02 FERTILIZER

- A. Fertilizer shall be equal to Milorganite (6-2-0), Louisville Green (5-3-0), or equal uniform in composition and free-flowing. Fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted. Rate of application shall be as recommended by nursery.

2.03 MULCH MATERIALS

- A. Hardwood Mulch: Organic hardwood mulch, free from deleterious materials, weeds, stones, sticks and growth or germination-inhibiting ingredients.
- B. Stone Mulch: Stone mulch shall be 1 1/2-inch decorative landscape stone.

2.04 ACCESSORIES

- A. Edging: Black Diamond by Valley View Industries; commercial edging by COL-MET, or equal. Metal edging shall be commercial grade 1/8 inch by 4 inches. Plastic edging shall have a minimum 4-inch side wall and 1-inch-diameter head and shall have a V-lip configuration for added stiffness and anchor-holding power.
- B. Membrane: 20-mil-thick, water-permeable polyolefin fabric.
- C. Wrapping Materials: Burlap or other commercial-grade tree wrap.
- D. Stakes: Softwood lumber, pointed end or mild steel angle, galvanized, pointed end.
- E. Cable, Wire, Eye Bolts: Noncorrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.
- F. Tree Protectors: Rubber sleeves over cable to protect tree stems, trunks, and branches.

PART 3—EXECUTION

3.01 PLANTING

- A. Plants should be planted on the day of delivery. If this is not possible, protect the stock not planted. Plant material shall be kept in the shade, well protected with soil, wet moss or other acceptable material, and shall be well watered. Plants shall not be bound with wire or rope at any time to avoid damaging the bark or breaking branches.

- B. Plants shall be lifted and handled from the bottom of the ball only. Plants moved with a ball will not be accepted if the ball is cracked, loose, or broken before or during the planting operations.
- C. Fertilizer shall be delivered to site in original, unopened containers, each bearing manufacturer's guaranteed analysis. Packaged materials shall be stored off ground and protected from moisture.
- D. CONTRACTOR shall coordinate planting Work with installation of sod and the construction of other site features.
- E. CONTRACTOR shall take precautions to provide that equipment and vehicles do not disturb or damage existing site grading, walks, drives, utilities, plants, etc., and shall replace and/or return to original condition any damage caused by CONTRACTOR's negligence at no cost to OWNER.
- F. CONTRACTOR shall maintain plantings immediately upon installation of plants and continue until acceptance, including watering, weeding, removal of dead material, resetting of plants to proper grade and plumb position, and other necessary operations.
- G. Plants shall be alive and in good, healthy, and flourishing condition of growth at the end of the correction period.
- H. Any plant installed under this Contract that is dead or not in a vigorous, thriving condition shall be removed from the site and replaced at CONTRACTOR's cost as soon as conditions permit during the normal planting season. In case of any questions regarding the condition of a rejected plant, CONTRACTOR may elect to allow such plant to remain through another complete growing season. If at that time, the rejected plant is found to be dead or in an unhealthy or badly impaired condition, it shall be replaced. One replacement after acceptance shall constitute fulfillment of CONTRACTOR's guarantee for the particular plant replaced. All replacements shall be plants of the same kind and size as specified originally. CONTRACTOR shall make all necessary repairs required because of plant replacements. Such repairs shall be done at no extra cost to OWNER. Plants shall be replaced, mulched, wrapped, fertilized, pruned, and restored to original condition at no extra cost to OWNER.
- I. Plant pits shall be excavated with vertical sides. These holes shall be no deeper than the depth of the ball, container, or root system when the plant is at its proper grade. Set plants vertical.
- J. Place topsoil in holes around roots or balls, mixed with fertilizer and peat moss or compost. Topsoil around roots shall be compacted and watered. After plant pit is backfilled, shallow basin shall be formed with ridge of soil to facilitate watering.
- K. Place plants where indicated on the Drawings. Position plants for appearance.
- L. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.
- M. Remove nonbiodegradable root containers and twine.

- N. Soil excavated from plant pits that is similar in nature to topsoil and is determined to be suitable for planting soil shall be thoroughly mixed with one part of peat to five parts of existing soil. Very poor soils of clay, gumbo, gravel, hard-pan, or other soils injurious to plants shall not be used.
- O. If quantity of soil excavated from planting pits is not adequate for planting, CONTRACTOR shall furnish imported planting soil consisting of partially decomposed vegetable matter of natural occurrence. Such soil shall be black, clean, low in content of mineral or woody material, mildly acidic, fertile and friable. This soil shall be mixed with one part of peat to five parts of soil. Peat shall be a domestic product consisting of partially decomposed vegetable matter of natural occurrence; black, clean, granulated, or shredded.
- P. Deciduous trees and shrubs shall be planted from September 15 to December 1 and from April 1 to June 1. All trees and shrubs shall be planted to provide the maximum growing time allowable under the Contract Times. At the option and on full responsibility of CONTRACTOR, planting operations may be conducted under unseasonable conditions without additional compensation or change to warranty.
- Q. CONTRACTOR shall stake out on the ground the location of all plants before excavation is begun, and review layout with OWNER. Plants installed at incorrect locations shall be relocated by CONTRACTOR at no expense to OWNER.
- R. CONTRACTOR shall excavate the plant pit, centered at the location stake, cylindrical in shape with vertical sides and flat or saucer-shaped bottom. Planting soil for backfilling shall be kept separate from excavated subsoil. Pit shall be large enough to provide at least 12 inches of planting soil backfill around and beneath the root system. Where surface or subsurface conditions prevent digging a plant pit to specified dimensions, obtain approval from landscape architect to modify location or pit dimensions.
- S. The root ball shall be centered in the plant pit resting on 12 inches of planting soil well-tamped. The plant hole shall be backfilled with planting soil placed in layers around the root ball. Each layer shall be hand-tamped in place in a manner to avoid injury to roots and ball. When approximately two thirds of the plant hole has been backfilled, the hole shall be filled with water to allow the soil to settle around the roots. Top of root ball shall be 1-inch above surrounding grade. The cord or wire securing burlap at base of tree shall be cut, with the burlap folded back.
- T. Just prior to observation for acceptance, CONTRACTOR shall prune all plantings. The amount of pruning will be limited to the minimum necessary to remove dead or injured twigs and branches to compensate for loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant.
- U. CONTRACTOR shall promptly remove any soil, peat, or similar material that has been brought onto paved areas by planting operations, keeping those areas clean at all times, and shall remove all debris resulting from planting operations from the site.
- V. Replacement plantings shall match existing plant type, with minimum 4-year nursery growth.

3.02 TREE REMOVAL AND REPLACEMENT

- A. It is intended that as many trees as possible be saved during construction. No trees, except those so designated, shall be removed without prior approval of OWNER. CONTRACTOR

shall conduct the work to protect all trees to remain. CONTRACTOR shall provide suitable fencing installed at the tree drip line for all trees within the construction area to protect trees from damage and soil compaction by its equipment.

- B. Trees that are damaged during construction shall be repaired. CONTRACTOR shall retain the services of a professional nurseryman who is a member of the National Arborist Association to direct CONTRACTOR on the proper repair of damaged trees. Damaged limbs and roots shall be pruned or dressed according to recommendations of the nurseryman. Backfill shall be replaced as soon as possible to reduce exposure of roots to air. Scarfed areas on trees shall be suitably dressed. Compaction of root areas under the drip line of the tree is to be avoided whenever possible.
- C. When removing trees, special care shall be taken to not damage surrounding private property. Costs for tree removal or replacement and construction around trees shall be included in the price bid for the work.

3.03 INSTALLATION OF ACCESSORIES

- A. Place edging around stone mulch where shown on the Drawings. Install edging using stakes at approximately 4 feet on center.
- B. Place membrane (weed barrier) in all areas to receive stone or hardwood mulch.
- C. Wrap deciduous shade and flowering tree trunks and place tree protectors.

3.04 MULCH

- A. Place stone mulch to 3-inch depth over membrane in all areas indicated on the Drawings.
- B. Place organic hardwood mulch to a depth of 3 to 4 inches over membrane for all trees and plants unless mulched with other materials as indicated on the Drawings.

3.05 MAINTENANCE

- A. Maintain plant life for three months after date of substantial completion.
- B. Neatly trim plants where necessary.
- C. Immediately remove clippings after trimming.
- D. Water to prevent soil from drying out.
- E. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- F. Apply pesticides in accordance with manufacturer's instructions.

END OF SECTION

SECTION 33 00 10

BURIED PIPING AND APPURTENANCES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. All underground piping, valves, and appurtenances of every description.
 - 2. Excavation, dewatering, and backfilling for all work under this section unless otherwise noted.
 - 3. Concrete foundations and anchor bolts for all equipment furnished under this section.
 - 4. Underground piping connections to all equipment, whether furnished under this section or not.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. Measurement and Payment: Payment for all work, including materials, equipment, and miscellaneous items necessary to complete the installation, will be made at the Lump Sum Bid for buried piping and appurtenances.

1.02 REFERENCED SPECIFICATIONS

- A. Standard Specifications for Water and Sewer Construction in Illinois, current edition, referred to herein as SSWSC.
- B. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications, referred to herein as SSRBC.

1.03 CODES AND STANDARDS

- A. Comply with the requirements of:
 - 1. NFPA 54—National Fuel Gas Code (Current Edition).
 - 2. Polyethylene gas distribution piping shall be installed in accordance with CFR 49, Part 192, Subpart G (mains), Subpart H (service lines), applicable codes and regulations, and ASTM D2774.
- B. Before any polyethylene fusion welding is performed, CONTRACTOR shall submit certification that the welders to be used on this project have successfully demonstrated proper welding procedures in accordance with the Code of Federal Regulations, Title 49, Part 192, Section 192.285.
- C. ENGINEER and OWNER reserve the right to test the work of any welder employed on the project, at CONTRACTOR's expense. If the work of the welder is found to be unsatisfactory, the welder shall be prevented from doing further welding on the project.

1.04 SUBMITTALS

- A. Shop Drawings: General arrangement drawings of 3 inches or larger exterior (belowground) ductile iron piping shall be submitted to ENGINEER for approval. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, pipe restraint, valves, and appurtenances.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or-equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

- A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials in contact with water to be used for potable water supplies shall be National Sanitation Foundation (NSF)-approved.
- B. Size and Type:
 - 1. All materials shall conform to the size and type shown on the Drawings or called for in the specifications.
 - 2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by CONTRACTOR and submitted for review by ENGINEER.
- C. Materials provided shall be suitable for the conditions in which they are being installed and used. CONTRACTOR shall review installation requirements of the Contract with material suppliers and incorporate any additional installation requirements necessary to meet the required use within the price bid for the Work.
- D. All pipe and materials used in performance of the Work shall be clearly marked as to strength, class, or grade. Pipe and materials not so marked shall be subject to rejection.

- E. When requested by ENGINEER, material suppliers shall furnish certificates of compliance indicating that all tests required by various Standards have been conducted and that the test results comply with the Standards.
- F. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by CONTRACTOR and submitted for review by ENGINEER.

2.02 MANHOLES

- A. General: All provisions of Drawing 01-975-43A, enclosed in these specifications, except those contrary to provisions delineated herein or on the Drawings shall apply to manholes.
- B. Unless otherwise specified or shown on the Drawings for special manholes, all manholes shall be reinforced concrete precast manholes. Reinforced concrete manhole base sections, riser sections, cones, and flat slabs shall conform to the requirements of ASTM C478. Solid precast manhole bottoms shall be provided except where shown on the Drawings. Manholes shall be provided with minimum diameters as shown on Drawing 01-975-43A.
- C. Manhole top sections shall be precast reinforced eccentric cones unless precast reinforced flat slabs are specifically required or shown on the Drawings or are necessary because of shallow depth. Flat slabs shall have opening offset unless otherwise required or shown. Flat slabs shall be designed for HS20 loadings.
- D. Unless otherwise specified or shown on the Drawings, all underground utility structures shall be precast, reinforced concrete. Reinforced concrete base sections, riser sections, and flat slabs shall conform to the requirements of ASTM C858. Flat slabs shall be designed for HS20 loadings. Solid precast bottoms shall be provided unless otherwise shown on the Drawings.
- E. Concrete Manhole Chimney Adjusting Rings:
 - 1. Provide concrete manhole adjusting rings as shown in Drawing 01-975-43A.
 - 2. Precast concrete adjusting rings for standard manholes shall have an inside diameter of 26 inches, be not less than 2 inches nor more than 6 inches high, and shall have a wall thickness of 6 inches unless otherwise specified. The rings shall contain a minimum of one No. 2 reinforcing rod centered within the ring. The joints between rings and between rings and castings shall be sealed with preformed flexible joint sealant as specified herein.
 - 3. CONTRACTOR shall supply ring materials, adhesive, labor, and equipment to permanently install the rings in strict accordance to manufacturer's recommendations. Manhole casting rims shall be set flush with constructed road surface. Manhole casting rims within roadways shall be set 1/4 inch to 1/2 inch below finished pavement grade. Ring inside diameter shall be 24-inch nominal, or larger to match frame.
- F. Frames and Covers:
 - 1. CONTRACTOR shall provide internal manhole frame chimney seal. The seal shall be made of a rubber type product, with a minimum thickness of 1/8 inch, a minimum unstretched width of 8 inches and be extruded or molded from a high-grade rubber compound conforming to the applicable requirements of ASTM C923, with a minimum 1,500 psi tensile strength, a maximum 18 percent compression set, and a hardness (durometer) of 48 $\pm$ 5. The bands used for compressing the sleeve against the

manhole shall be fabricated from stainless steel conforming to ASTM A240, Type 304, for sheet and ASTM A479, Type 304, for rods. Any screws, bolts, or nuts used on these bands shall be stainless steel conforming to ASTM F593 and F594, Type 304. The internal seal or its appurtenances shall not extend far enough into the manhole opening to restrict entry into or exit from the manhole.

2. Manhole frame-chimney seals shall be designed to prevent the leakage of water into the manhole at the area of the joint between the manhole frame and chimney continuously throughout a 20-year design life. The seal shall remain flexible, allowing repeated vertical movements of the frame because of frost lift, ground movement, or other causes of up to 2 inches and/or repeated horizontal movements of the frame because of thermal movement of the pavement or other causes of up to 1/2 inch, both rates of movement occurring at rates not less than 0.10 inch per minute. If the seal is an internal seal, it and its appurtenances shall not extend far enough into the manhole opening to restrict entry or exit from the manhole.
3. The seal shall be made of only materials that have been successfully used in sanitary sewer construction for at least 10 years and have proven to be resistant to sanitary sewage; corrosion or rotting under wet or dry conditions; the gaseous environment in sanitary sewers and at road surfaces including common levels of ozone, carbon monoxide and other trace gases at the sites of installations; the biological environment in soils and sanitary sewers; chemical attacks by road salts, road oil and common street spillages or solvents used in street construction or maintenance; the temperature ranges, variations and gradients in and between manhole frames and chimneys in the climate of the location of construction; variations in moisture conditions and humidity; fatigue failure caused by a minimum of 30 freeze thaw cycles per year; or vibrations because of traffic loadings; fatigue failure because of repeated variations of tensile, compressive and shear stresses and repeated elongation and compression; and any combination of the foregoing. The materials used shall be compatible with each other and the manhole materials.

G. Valve Boxes:

1. A valve box shall be provided for fire hydrant auxiliary valves and for valves in the main. The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. A Gate Valve Adaptor by Adaptor Inc., or equal, shall be provided. The valve box shall not transmit shock or stress to the valve.
2. Valve boxes shall be made of cast iron conforming to ASTM A48. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall have a normal smooth casting finish. The castings shall be thoroughly coated with a 1 mil minimum thickness bituminous coating. Valve boxes shall be 5 1/4 inches in diameter. Valve boxes shall have a maximum length of 7 feet when extended without extension sections. Extensions shall be provided for deeper mains.
3. Valve boxes shall consist of a base section, tubular mid and top sections, both with cast threads by which one can be telescoped on the other, extension sections if required, and a circular drop cover unless indicated otherwise.
4. Valve boxes shall be installed in accordance with Drawing 01-975-64A.
5. Valve boxes shall be Tyler/Union 6850 Series, 4 inches through 12 inches, or equal. Extension heights shall be provided as required. Lids shall be marked for appropriate

use. CONTRACTOR shall verify that all valve boxes are large enough to accommodate all operating nuts and wrenches.

H. Floor boxes shall conform to Section 40 05 00—Piping and Appurtenances.

I. Precast Reinforced Concrete Manholes:

1. Lengths of manhole riser (barrel) shall be furnished in such combinations as to conveniently make up the depth of the manhole. A maximum of two handling holes per length of riser will be permitted.
2. Drop entrances to sanitary sewer manholes shall be installed where indicated on the Drawings and as shown on Drawing 01-975-43A. Drop entrances shall be of the same diameter as the sewer main from sizes 8 inches through 18 inches. For larger diameters, the drop shall be 18 inches unless otherwise shown on the Drawings. Drop entrances for storm sewer manholes are not required.
3. The interior bottom of sanitary sewer and storm sewer manholes shall be constructed of concrete benches which shall be precast or poured in place in the field. Benches shall extend to the top of each pipe to a maximum height of 42 inches. Flow lines shall be made smooth with uniform curves to promote flow through the manhole.
4. All joints between manhole pipe sections and top shall be tongue and groove conforming to ASTM C443. Manhole joints shall be sealed with circular O ring or preformed flexible joint sealant that shall be Ram-nek, Kent-Seal, Mas-stik, or equal.
5. Manhole connections for sanitary sewer mains shall be made using flexible, watertight connections, PSX Press Seal, Kor N Seal, or equal, for sewers up through 18-inch diameter. All other sanitary sewer manhole connections shall be made with A Lok, PSX Press Seal, Kor N Seal, or equal. The joint shall provide a flexible, watertight connection between pipe and manhole. Manhole connections for storm sewer mains and leads may be made with cast-in-place concrete during completion of manhole interior in lieu of above.
6. Manhole bottoms for sanitary sewer shall be monolithically precast with the bottom section for manholes up through 6-foot diameter. Bottoms for larger diameter manholes shall be precast but need not be monolithically cast with the bottom section. All other manhole bottoms shall be either poured in place or precast concrete.
7. Manhole bottoms for air release manholes, force main cleanout manholes and water system valve manholes shall have an 18-inch diameter sump hole. Sump hole shall have a solid concrete bottom where groundwater is above the bottom of the manhole.
8. Unless otherwise shown on the Drawings, manholes shall be furnished of minimum diameters as shown on Drawing 01-975-43A. Manholes shall be furnished large enough to provide a minimum distance, between adjacent pipe, measured tangentially along the inside face of the manhole, equal to one half the outside diameter of the intersecting sewer pipe. In any event, manholes shall be furnished in the diameter necessary to accommodate intersecting sewer pipe and the pipe to manhole connection as proposed for use.
9. Steps shall be installed in all manholes by the manufacturer as shown on Drawing 01-975-43A and shall be cast iron conforming to ASTM A48 or steel reinforced plastic conforming to ASTM A615, Grade 60 and ASTM D4101 with molded copolymer polypropylene covering conforming to ASTM D4101, Type PP200B33450Z02, or equal. Manhole steps shall be spaced 16 inches on center with an allowable tolerance of (plus or minus) 1 inch. Steps shall be inserted in manhole riser, cone, and flat slab sections prior to the initial set of the concrete in accordance with ASTM C478 and shall have maximum embedment and pullout resistance in accordance with ASTM C497. The top step shall be located 10 inches or less from the

- top of the manhole cone section or uppermost structure section. Manhole steps shall be Neenah Type R-1981-N, M.A Industries, Inc. PS1-PF, or equal.
10. Precast reinforced concrete manhole risers and tops shall be tested in accordance with ASTM C497. Precast reinforced concrete manhole risers and tops meeting the strength requirements will be considered acceptable and shall be stamped with an appropriate monogram. When requested, copies of test reports shall be submitted to ENGINEER before the manhole sections are installed in the Project. Final acceptance will be made after field inspection upon delivery to the jobsite.
 11. Precast reinforced concrete manhole sections shall be subject to rejection for failure to conform to any of the requirements of the Standard Specifications. In addition, individual sections of manhole risers and tops may be rejected because of any of the following reasons:
 - a. Fracture or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
 - b. Defects that indicate imperfect proportioning, mixing, and molding.
 - c. Surface defects indicating honey combed or open texture.
 - d. Damaged ends, where such damage would prevent making a satisfactory joint.
 - e. Manhole steps out of line, or not properly spaced.
 - f. Noticeable infiltration into manhole.
 - g. Variation in diameter of the manhole section of more than 1% from the nominal diameter.
 - h. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more regardless of position in the section wall.
- J. Each precast reinforced concrete manhole riser and top section shall be clearly marked with the name or trademark of the manufacturer and the date of manufacture. This marking shall be indented into the manhole section or shall be painted thereon with waterproof paint.
- K. Masonry:
1. Concrete block shall meet the requirements of ASTM C139.
 2. The face size of stretcher units shall be 7 5/8 inches by 15 5/8 inches. Variations in the face size shall be within the limits permitted by the above standards. Special shapes and sizes shall be furnished and installed as necessary.
 3. Sewer brick shall conform to ASTM C32. All sewer brick shall be Grade SS and manhole brick shall be Grade MS. Sewer brick shall be installed as shown on the Drawings furnished by ENGINEER and as required in the construction of sewer appurtenances.
- L. Manhole and Inlet Castings:
1. Sanitary manholes shall be East Jordan Iron Works, No. 1050, EX HD, watertight lid with concealed pickhole, o-ring gaskets, and "CREST HILL" and "SANITARY" cast in lid.
 2. Water valve vault manholes shall be East Jordan Iron Works, No. 1040, EX HD lid with concealed pickhole and "CREST HILL" and "WATER" cast in lid.
 3. Storm manholes shall be East Jordan Iron Works, No. 1040, EX HD lid with concealed pickhole and "CREST HILL" and "STORM" cast in lid for lids indicated as "solid" on the Drawings. For lids indicated as "open" on the Drawings, use the same casting, but with a Type M1 radial flat grate.
 4. Drainage structures in areas with unpaved surfaces shall be East Jordan Iron Works, No. 6527.

5. Drainage structures in mountable curb and gutter shall be East Jordan Iron Works, No. 7171 with Type M1 grate.
 6. Drainage structures in barrier curb and gutter shall be East Jordan Iron Works, No. 7210 with Type M2 grate.
 7. Frames for valve manholes, storm manholes, and sanitary manholes shall be East Jordan Iron Works 1050.
- M. Mortar: Mortar shall meet the requirements of ASTM C270. Mortar shall be one part Portland cement and 2 1/4 parts washed mortar sand.
- N. Preformed Flexible Joint Sealant: Preformed flexible joint sealant shall be EZ Stik, Kent Seal, Ram Nek, or equal, meeting the requirements of ASTM C990.
- O. O-Rings: O-rings shall meet the requirements of ASTM C443.

2.03 BURIED PIPING

- A. Ductile Iron Piping and Fittings:
1. Unless otherwise shown or specified, all underground piping 3 inches in diameter or larger shall be ductile iron conforming to AWWA C151/A21.51 with mechanical joints or push-on joints. Unless otherwise shown or specified, all piping shall be minimum Special Thickness Class 54 with a water hammer allowance of 100 psi. Additional pipe wall thickness shall be furnished as required by AWWA C150 for buried piping with the depth of cover as shown on the Drawings when using laying condition 4 of AWWA C600 or the Class C Bedding Detail as shown on Drawing 01-975-43A.
 2. Each pipe and fitting shall have the class or nominal thickness, country where cast, casting period, manufacturer's mark, the year in which the pipe was produced, and the letters DI or DUCTILE cast or stamped thereon. Improper or incomplete marking will be cause for rejection of the pipe or fitting.
 3. CONTRACTOR shall furnish certification data representing each class of pipe or fitting furnished. The certification report shall clearly state that all pipe and fittings furnished meet the appropriate AWWA specification. Ductile iron pipe shall consist of pipe centrifugally cast in metal or sand-lined molds. Pipe wall shall be homogeneous from inside to outside and shall be completely free of laminations, blisters, or other imperfections. Defects may be removed at the factory only.
 4. Except as otherwise specified, underground pipe shall have mechanical joints or push-on joints conforming to AWWA C110 and C111, as well as AWWA C153 (compact), with vulcanized styrene butadiene rubber gaskets conforming to AWWA C111. Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe and provide joint restraint are not acceptable. Bolts on mechanical joints shall be ASTM A242 high-strength low-alloy steel, conforming to AWWA C111 and ANSI A21.11. Certificate to that effect shall be provided.
 5. For ductile iron pipe systems requiring pressure testing, restrained joints shall be provided in accordance with Part 3—Execution. Mechanical joints shall be restrained with MEGALUG® Series 1100 or 1100 SD, by EBAA Iron Sales, Inc., UNIFLANGE Series 1400 by Ford Meter Box Co., Inc., or equal, restraint. Push-on joints for ductile iron piping shall be restrained with MEGALUG® Series 1700 or 1100 HD, by EBAA Iron Sales, Inc., UNIFLANGE Series 1450 by Ford Meter Box Co., Inc., Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, TR Flex by U.S. Pipe Company, TR Flex by McWane, or equal.

- a. Pipe restraint fittings shall be provided as follows:
 - (1) For ductile iron pipe with ductile iron mechanical joints MEGALUG® Series 1100 or 1100SD by EBAA Iron Sales, Inc.; Series D SLDE or SSLD by Sigma; Series 3000 or 3000S by Star Pipe Products; or equal.
 - (2) For ductile iron pipe with ductile iron push on joints MEGALUG® Series 1100HD or 1700 by EBAA Iron Sales, Inc Lok Ring by American Cast Iron Pipe Company; TR Flex by U.S. Pipe Company; or equal.
 - (3) For PVC pipe with ductile iron mechanical joint fittings—MEGALUG® Series 2000 PV, 1100SV, or 2000SV by EBBA Iron Sales, Inc.; Series D SLCE or PVM by Sigma; Series 1000C or 4000 by Star Pipe Products; or equal.
 - (4) For PVC pipe with PVC push on joints (not solvent welded)—MEGALUG® Series 1100HV, 1900, or 2800 by EBAA Iron Sales, Inc.; Series SLCEH, PWP (greater than 12-inch only), or D PWP (12 inches or less) by Sigma; Series 4100P by Star Pipe Products; or equal.
 - b. Gland body, wedges, and wedge actuating components shall be ductile iron conforming to ASTM A536 Grade 65 45 12. Bolts and tie rods shall be high strength low alloy steel conforming to AWWA C111.
 - c. Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe to provide joint restraint are not acceptable.
6. Joint restraint is not required for gravity sewers, drains, and those pipes designated in Paragraph 3.02.G.1. Infiltration/Exfiltration Tests.
 7. Underground pipe shall have mechanical joint ductile iron fittings conforming to AWWA C110 and C111 or AWWA C153 compact fittings with a minimum rated working pressure of 150 psi. Gaskets for fittings shall be as specified for underground piping.
 8. All ductile iron fittings shall be American Cast Iron Pipe, Tyler Union, U.S. Pipe, or equal, and shall be made in the United States of America.
 9. Ductile iron wall pipes shall be provided as shown on the Drawings. For piping over 24 inches that does not require restraints, wall pipes shall be provided with push-on joint connection at exterior end of wall pipe. For piping over 24 inches that requires restraint, wall pipes shall be provided with Flex Ring or Lok Ring by American Ductile Iron Pipe Company, TR Flex by U.S. Pipe Company, TR Flex by McWane, or equal, connection. For piping over 24 inches, wall pipes may also be provided with mechanical joint connection at exterior end of wall pipe. For piping that requires restraint, mechanical joint connections at exterior end of wall pipe shall be restrained as specified for mechanical joints.
 10. Unless otherwise specified, all exterior ductile iron piping and fittings shall be cement-mortar lined and asphaltic-coated inside. Cement-mortar lining shall be in accordance with AWWA C104. Unless otherwise specified, underground piping and fittings shall be shop primed or asphaltic-coated outside. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings. Buried piping shall be coated with a layer of arc applied zinc per ISO 8179 Standard. The zinc applied shall be 200 g/m² of pipe surface area. A topcoat layer of asphaltic coating shall be applied per ANSI/AWWA C151-A21-51 Section 4.4 Coatings and Linings.
 11. For potable water systems, the outside pipe coating shall comply with AWWA C151. Lining and coatings shall be suitable with potable water systems. The asphaltic coating shall be applied over the cement lining on the inside of the pipe and directly on the outside of the pipe. The coatings shall be smooth and impervious to water without any tendency to scale off.

12. Piping and fittings for installation in manholes, wet wells or other such structures, and elsewhere exterior as shown on the Drawings or specified shall be flanged and provided as specified in Section 40 05 00–Piping and Appurtenances.
13. All buried ductile iron piping and appurtenances shall be polyethylene encased in accordance with AWWA C105. Polyethylene encasement shall be Class C (carbon black) and shall be minimum 8 mil thickness. Tape for securing the film shall be a thermoplastic material with a pressure sensitive adhesive face capable of bonding to metal, asphaltic coating, and polyethylene. Tape shall have a minimum thickness of 8 mils and a minimum width of 1 inch. The polyethylene film envelope shall be as free as is commercially possible of gels, streaks, pinholes, particles of foreign matter, and undispersed raw materials. There shall be no other visible defect, such as holes, tears, blisters, or thinning out at folds. For buried pipe polyethylene encasement shall be V-BIO polyethylene encasement and shall meet ANSI/AWWA C105-A21.5 Polyethylene Encasement for Ductile Iron Pipe. V-BIO to include an anti-microbial Biocide as well as a corrosion inhibitor. Specifications to include 8 mil thickness, tensile strength of 3,600 psi per ASTM D882, elongation of 800% min per ASTM D882, and dielectric strength of 800 V/mil thickness per ASTM D149. Installation of V-BIO polyethylene encasement shall be per ANSI/AWWA C105-A21.5 Polyethylene Encasement for Ductile Iron Pipe.
14. Tapping and Bonding: In cases where corporation stops are to be tapped into mains, pipe wall thickness shall be furnished as specified in AWWA C151 to provide four threads or pipe saddles shall be furnished as approved by manufacturer.
15. Cutting in and Repair Tees and Sleeves and Tapping Tees: Cutting-in and repair tees and sleeves and tapping tees shall be of ductile or cast iron with the same rated working pressure of the pipe in which they are installed but no less than 150 psi.
16. Exterior Joints, Fittings, and Gaskets: Joints, fittings, and gaskets shall have the same rated working pressure of the pipe in which they are installed but no less than a minimum rated working pressure of 150 psi.

B. Copper Water Tubing:

1. Copper tubing installed within trenches shall be Type K soft annealed seamless copper tubing and shall conform to the Specifications of ASTM B88. All other copper shall be Type K hard copper conforming to ASTM B88.
2. Fittings shall be of the flared or compression type. Unions shall be extra heavy three-part unions only. Joints shall not be used under floor slabs.
3. The name or trademark of the manufacturer and a mark indicating the type shall be permanently and plainly marked on tubing.
4. Fittings for copper tubing shall be copper alloy meeting the requirements of AWWA C800-14. The maximum lead content shall be 0.25%. They shall have uniformity in wall thickness and strength and shall be free from any defect that may affect their serviceability.
5. Each fitting shall be permanently and plainly marked with the name or trademark of the manufacturer.
6. Shutoff valves shall be placed on each branch for all underground piping.

C. PVC Piping–Chemical Feed and Chemical Solution Piping:

1. PVC Pipe (Schedule Pipe)–Less Than 4 Inches: PVC Schedule pipe less than 4 inches in diameter shall conform to the requirements of ASTM D1785 for Schedules 40, 80, or 120. Pipe shall be solvent weld type conforming to ASTM D2855 with bell conforming to ASTM D2672. Pressure rating for pipe supplied shall be minimum 150 psi. PVC pipe diameter shall conform to galvanized iron or steel pipe sizes (IPS).

2. Provide tracer wire as specified.

D. Solid Wall PVC:

1. Polyvinyl chloride (PVC) pipe shall meet the requirements of ASTM D3034 for pipe sizes 4 inches through 15 inches and ASTM F679 for pipe sizes 18 inches through 60 inches.
2. PVC material for ASTM D3034 pipe shall have cell classification 12454 or 12364 as defined in ASTM D1784 with minimum modulus of elasticity of 400,000 psi. Pipe stiffness shall be minimum 46 psi when tested in accordance with ASTM D2412. Pipe shall have a maximum standard dimension ratio (SDR) of 35.
3. PVC material for ASTM F679 pipe shall have cell classification 12454 or 12364 as defined in ASTM D1784 with a minimum modulus of elasticity of 500,000 psi. Pipe stiffness shall be a minimum 115 psi when tested in accordance with ASTM D2412.
4. Pipe and fittings shall be the product of one manufacturer, and the manufacturer shall have experience records substantiating acceptable performance of the pipe and fittings to be furnished. The minimum wall thickness of fittings shall be the same as the pipe to which it connects.
5. Acceptance of piping and fittings shall be subject to tests conducted in accordance with ASTM D3034 and/or ASTM F679.
6. Fittings such as saddles, elbows, tees, wyes, and others shall be of material and construction corresponding to and have a joint design compatible with the adjacent pipe. Approved adapters shall be provided for transitions to other types of pipe.
7. Joints shall be of the elastomeric type for pipes 4 inches or larger and elastomeric or solvent cement for pipes less than 4 inches.
8. Elastomeric joints shall be a bell and spigot joint conforming to ASTM D3212 sealed by a rubber gasket conforming to ASTM F477 so that the assembly will remain watertight under all conditions of service, including the movements resulting from the expansion, contraction, settlement, and deformation of the pipe. Bells shall be formed integrally with the pipe and shall contain a factory-installed positively restrained gasket.
9. Solvent cement joints shall be assembled using solvent cement obtained from the pipe manufacturer, which conforms to the requirements of ASTM D2564.
10. The assembled joint shall pass the performance tests as required in ASTM D3212.

E. Gravity Sanitary Sewer Service Branches and Laterals:

1. Branches (tees and wyes) shall be of the same material as the main except for reinforced concrete pipe used for sanitary sewer. For reinforced concrete pipe, special branches shall be furnished and installed to accept the lateral. Such special branches are subject to review by ENGINEER.
2. If a different thermoplastic material is specified for laterals than for the main line, appropriate solvent welds, fittings, transition couplings, and other appurtenances shall be provided to effect a water tight seal.
3. Fittings for laterals shall be of the same material as the lateral pipe unless special fittings are needed for transition between material types or sizes or standard fittings are not manufactured.
4. Where the wye or tee branches and laterals are of dissimilar materials, CONTRACTOR shall provide a transition coupling for the connection.
5. All fittings used, including type of jointing, are subject to review by ENGINEER.

- F. PVC Pipe (AWWA) and PVC Pressure Pipe Fittings (4 Inches and Larger):
1. PVC water main shall be AWWA PVC pressure-rated pipe and shall conform to the requirements of AWWA C900 for pipe from 4 inches to 60 inches. Pipe shall be furnished with integral elastomeric bell and spigot joints.
 2. PVC pipe diameter shall conform to ductile iron pipe sizes (DIPS). The type of PVC material, nominal pipe size, standard dimension ratio, and pressure class shall be not less than pressure class 235 and not greater than pipe dimension ratio 18.
 3. Markings on pipe shall include the following: Nominal pipe size, type of plastic pipe material, DR number, AWWA Designation with which the pipe complies, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for transport of potable water.
 4. All fittings for PVC pressure pipe shall be iron pipe fittings as specified herein.
 5. Provide tracer wire for underground PVC piping as specified herein, unless otherwise noted.
- G. Transition Couplings for Gravity Sewer Service: Transition couplings shall be provided to join dissimilar pipe materials or to connect pipe where a standard pipe joint cannot be provided. Couplings shall be designed to join the pipe materials matching flow line elevations. Transition couplings for gravity sewer service shall be Fernco 5000 RC Strongback, Mission Flex Seal ARC Shielded, or equal. Shear rings shall be provided to minimize differential settlement. All bands, clamps, shear rings and other metal components shall be stainless steel. Bushings or transitions shall be provided to accommodate pipe size differences.
- H. Miscellaneous Pipe:
1. Piping needed for repair or reconstruction of existing utilities and appurtenances shall be of the same type and strength as the existing. The type of jointing used in repair and reconstruction shall be reviewed by ENGINEER. Special fittings shall be furnished and installed as necessary for repair, reconstruction, or connection of existing facilities.
 2. All special fittings on or for connection to utilities shall be specifically built for the type of gasket used. Special fittings shall have joints of the same type as the utility to which the connection is being made.

2.04 VALVES (VALVES FOR UNDERGROUND SERVICE ARE SPECIFIED IN DIVISIONS 23 AND 40)

- A. Valves for natural gas service shall conform to Section 23 11 23–Facility Fuel Gas Piping.
- B. Valves shall conform to Section 40 05 00–Piping and Appurtenances.
- C. Corporation Stop and Curb Stop Valves:
1. Performance Requirements: Lead Free Requirements: All materials that contact potable water shall be lead free. Lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per the Federal Safe Drinking Water Act as amended January 4th, 2011 Section 1417. All products used in potable water systems shall be UL classified in accordance with ANSI/NSF 61 for potable water service and shall meet the low lead requirements of NSF 372.
 2. Corporation Stop Valves: 2 Inches and smaller: Bronze body ground key valve, bronze plug, AWWA taper thread inlet and copper flare outlet nut connections or compression type, AWWA C800.

3. Curb Stop Valves: Boxes 2 Inches and smaller: Bronze body plug valve, bronze plug, quarter turn check, O ring seals, copper flare nut connections or compression type, AWWA C800. Provide Minneapolis type curb box complete with lid and stationary rod.

2.05 FIRE HYDRANTS

- A. Fire hydrants provided under these Standard Specifications shall conform to AWWA C502 for Dry Barrel Fire Hydrants. Hydrants shall have the following features:

Bury Length	Approximately 5 1/2 feet to traffic flange.
Nozzle Size	One 4 1/2-inch- and two 2 1/2-inch-diameter openings.
Nozzle Threads	National standard fire hose coupling screw threads.
Drain Port:	Drain port at base of hydrant barrel. Plug drain port when hydrant installed in area where groundwater level may rise above drain port.
Size of Main Valve Opening	5 1/4-inch-diameter minimum. The hydrant lead connection shall be minimum 6-inch-diameter mechanical joint.
Torque Requirements	Hydrant shall comply with AWWA C502 even if greater than 5-foot bury.
Lubrication	Nontoxic and providing proper lubrication for a temperature range of -30°F to +120°F.

- B. Hydrants shall have permanent markings identifying the manufacturer by name, initials, insignia, or abbreviations in common usage, and designating the size of the main valve opening and the year of manufacture. Markings shall be so placed as to be readily discernible and legible after hydrants have been installed.
- C. CONTRACTOR shall furnish certification to ENGINEER that the hydrant and all material used in its construction conform to the applicable requirements of AWWA C502 and the supplementary requirements thereto.
- D. All joints on fire hydrant leads shall be made using pipe restraint specified herein. Approximately 1/2 cubic yard of bedding stone shall be placed from the bottom of the trench around the hydrant elbow and up the hydrant barrel. Bedding stone shall be wrapped completely in filter fabric to prevent the in migration of fine materials.
- E. CONTRACTOR shall furnish all necessary fittings in the fire hydrant lead to install the fire hydrant in a plumb condition at locations shown on the Drawings and at the specified depth of bury. The pumper nozzle of all fire hydrants shall be installed with the nozzle pointing toward the street. ENGINEER reserves the right to alter the location of fire hydrants from that shown on the Drawings.
- F. Hydrants shall be installed as shown on the Drawings.
- G. Fire Hydrant:
 1. Fire hydrant shall be Waterous 5BR250.
 2. Hydrant to be painted blue.
 3. Provide restrained joint system from auxiliary valve in road box back to tee.
 4. Connect hydrant to auxiliary valve with 2-foot length of pipe.
 5. Provide drain port at base of hydrant barrel. Plug drain port when hydrant installed in area where groundwater level may rise above drain port.

2.06 CONCRETE

- A. All concrete poured under this Contract, unless shown or specified otherwise, shall conform to the requirements of Division 03.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Underground Piping:
1. Utility lines shall be laid and installed to the lines and grades specified with valves, fittings, manholes, and other appurtenances at the specified locations; spigots centered in bells; and all manholes and riser pipes plumb. Water main shall be installed at the depth indicated. Water main, force main, and other pressure mains shall be installed to within (plus or minus) 0.1 feet of designed grades. Sanitary and storm sewer and laterals shall be installed to within (plus or minus) 0.03 feet of designed grades. Service lines shown on the Drawings are approximate. Staking shall be completed in conformance with Division 01.
 2. Deviations Occasioned by Underground Facilities: Wherever significant obstructions not shown on the Drawings are encountered during the progress of the Work, CONTRACTOR shall proceed in accordance with the General Conditions to notify owners and protect the facilities. Existing items unnecessarily damaged during the performance of the Work shall be repaired and replaced at the expense of CONTRACTOR.
 3. Prior to commencing pipe laying, CONTRACTOR shall notify ENGINEER of the intended date for starting Work. ENGINEER may request at CONTRACTOR's expense the removal and relaying of pipe which was installed prior to notification of ENGINEER.
 - a. Proper implements, tools, and facilities shall be provided and used by CONTRACTOR for the safe and convenient prosecution of the Work. All pipe, fittings, and appurtenances shall be carefully lowered into the trench piece by piece with a crane, rope, or other suitable tools or equipment, in such manner as to prevent damage to materials. Under no circumstance shall pipe be dropped or rolled into the trench.
 - b. Materials shall be as shown on the Drawings or as specified herein.
 4. Material Inspection: CONTRACTOR shall inspect the pipe, fittings, and appurtenances for defects when delivered to the jobsite and prior to lowering into the trench. Defective material shall be removed from the jobsite. All material shall be clean and free of deleterious substances prior to use in the Work.
 5. Except where noted or specified, all ductile iron underground piping shall be laid in accordance with AWWA C600 with the conditions that (a) blocking shall not be used to support pipe and (b) all bends and fittings shall be restrained as specified below, and pipe joints shall be restrained in all directions from all bends and fittings to the length as specified below.
 6. For restrained pipe joints, all underground ductile iron pipe joints (except for the branch of tees and dead ends) shall be restrained to the length listed below in all directions from all bends and fittings. The branch of tees shall be restrained to two times the length listed below. Dead ends shall be restrained to 2.5 times the length listed below. All joints on yard and fire hydrant leads shall be restrained. Where wall

penetrations occur at less than the length indicated below, the wall fittings shall also be restrained. Additional restraint shall be provided inside of structures as required.

MINIMUM LENGTH (IN FEET)
RESTRAINED PIPE FROM BENDS OR FROM BENDS OR FITTINGS
(POLYWRAPPED AND MINIMUM 6-FOOT BURY DEPTH)

Pipe Size, Inches	Test Pressure, psi				
	10	25	50	100	150
3 to 12	5	18	18	36	36
14 to 18	5	18	18	36	54
20 to 24	5	18	36	54	72

7. Force main and water main shall be installed in accordance with AWWA C600 for iron pipe, AWWA C605 for PVC pipe, and AWWA M55 for HDPE pipe. All plugs, caps, tees, hydrants, bends, and other fittings for water mains and force mains shall be provided with restrained joints.
8. PVC sewer and plant drain piping shall be installed in accordance with ASTM D2321. Except where noted or specified, PVC or other thermoplastic pressure piping shall be installed in accordance with ASTM D2774.
9. Except where noted or specified, reinforced concrete pipe shall be installed in accordance with ASTM C12.
10. Plumbing system shall be installed and tested in accordance with local and state plumbing code requirements and applicable portions of 2021 International Building Code. Where requirements conflict, the stricter standard shall apply.
11. CONTRACTOR shall lay all gravity pipe to the line and grade shown on the Drawings with bell ends uphill wherever possible. If not possible, CONTRACTOR shall lay pipe to the line and grade shown on the Drawings with bell ends in the direction of laying. Water piping and chemical solution piping shall have a minimum of 5.5 feet of cover. Unless shown otherwise, drainage piping shall clear floor slabs or footings by a minimum of 6 inches.
12. Any pipe or fittings cracked in cutting or handling or otherwise not free from defects shall not be used. Pipe must be kept clean of mortar, cement, clay, sand, or other material. When PVC piping is installed during hot weather, it shall be laid in the trench with slack or permitted to cool to ground temperature before it is cut to length for making final connections. PVC expansion joints shall be provided where needed.
13. At times when pipe laying is not in progress, the open ends of pipe shall be closed with plugs to prevent the entry of foreign material. Acceptable plugs include Foreman Nite Caps by APS, mechanical joint cap or plug, bladder plug, or test plug. All foreign material shall be removed from the pipe prior to acceptance.
14. The locations and elevations of existing piping and manholes are approximate. Where necessary, existing piping shall be exposed by CONTRACTOR to confirm location and elevation before installing new piping. Any changes in pipe location or elevation shall be approved by OWNER.
15. General Excavation:
 - a. Pipe Laying:
 - (1) All pipe shall be laid accurately to the line and grade as designated. Preparatory to making pipe joints, all surfaces of the portions of the pipe to be joined or of the factory made jointing material shall be clean and dry. Lubricants, primers, adhesives, and other joint material shall be used and

installed as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined, and adjusted in such a workmanlike manner as to obtain the degree of watertightness specified. Pertinent specifications from the joint and pipe manufacturer which outline procedures to be followed in making the joint shall be furnished to ENGINEER.

- (2) Wyes, tees, and special fittings shall be installed as called for on the Drawings, or as requested by ENGINEER. Wyes, tees, and special fittings, shall, in general, be jointed with the same type of joint as used in the pipe.
 - (3) In joining two dissimilar types of pipe, manufactured adapters and fittings shall be used. Adapters and fittings shall be configured to maintain invert elevations at same level.
 - (4) Joint deflections shall not exceed the limits established by the pipe manufacturer for the pipe and joint being used.
 - (5) Joints that are damaged because of carelessness, improper handling, or failure to prevent imperfections in manufacture shall be subject to rejection and gaskets shall be subject to rejection whenever they show surface cracking, tears, or splice separation.
 - (6) At times when pipe laying is not in progress, the open ends of pipe shall be closed with plugs to prevent the entry of foreign material. All foreign material shall be removed from the pipe prior to acceptance.
 - (7) After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with specified backfill material tamped around it except at the bells.
 - (8) Pipe shall be brought home by using a cross member and levers or jacks. It will not be permissible to push pipe home with motor powered excavation equipment.
 - (9) Force main and water main shall be installed in accordance with AWWA C600 for iron pipe, AWWA C605 for PVC pipe, and AWWA M55 for HDPE pipe. All plugs, caps, tees, hydrants, bends, and other fittings for water mains and force mains shall be provided with restrained joints.
- b. Sewer Service Branch and Lateral Installation:
- (1) CONTRACTOR shall furnish and install sanitary sewer and storm sewer branches, laterals, and leads as shown on the Drawings or requested by ENGINEER.
 - (2) Wye or tee branches: Wherever shown on the Drawings or requested by ENGINEER, wye or tee branches shall be provided for use in making sanitary sewer service and storm sewer inlet connections. Unless specified otherwise on the Drawings, wye or tee branches for sanitary sewer service lateral connections to single family residences shall be 4-inch diameter. All other sanitary sewer service lateral connections shall be 6 inches. Wye or tee branches for storm sewer inlet connections shall be of the size called for on the Drawings, 12 inches minimum.
 - (3) Sanitary sewer service branches shall be turned so that the branch is at an angle of 30 degrees or 45 degrees from the horizontal.
 - (4) Installation and Testing Requirements: Except for those branches that are to be used on storm sewers or for extending sanitary sewer service laterals, wye and tee branches shall be closed with airtight stoppers blocked to withstand air test pressures.

- c. Manholes:
 - (1) Manholes shall be installed in accordance with Drawing 01-975-41A for storm sewer, and Drawing 01-975-43A for sanitary sewer. Manholes shall be plumb with any steps aligned and openings located over steps. For sanitary sewers, openings shall be located over the bench and not the sewer flow line itself.
 - (2) All manholes shall be made watertight and shall show no visible signs of leakage at the time of final review and within the correction period. Any leakage shall be sealed from the exterior of the manhole.
- d. Storm Sewer Inlets:
 - (1) Storm sewer inlets shall be installed in accordance with Drawing 01-975-41A. Inlets shall be set to the line and grade as furnished by ENGINEER. The outside end of the lift hole shall be covered with filter fabric to prevent the entrance of fines into the inlet.
 - (2) Inlets shall be connected to the storm sewer main either at manholes, at wye branches in the main, or to other inlets, all as shown on the Drawings. Minimum size of inlet lead pipe shall be 12 inches.
 - (3) Storm inlets shall be backfilled to undisturbed soil and at least 2 feet along connecting piping with bedding material.
- e. Masonry:
 - (1) No masonry shall be laid when the temperature of the outside air is below 40°F unless all masonry materials are heated and protected against freezing.
 - (2) Only enough mortar shall be mixed that can be conveniently used before it reaches initial set. Retempering of mortar will not be permitted.
- f. Abandoning Utilities: Utilities to be abandoned shall, unless otherwise noted on the Drawings, be abandoned in place. Open ends of pipes shall be plugged with 12 inches of concrete. Manhole barrels, valve boxes and other such structures shall be removed to a point 3 feet below existing or final ground surface, whichever is lower, and shall then be filled with backfill material compacted to that of the trench backfill. An approximate 9-inch-diameter opening shall be made in the bottom of the structure to allow for groundwater movement.
- g. Connections to and Modifications of Structures and Mains:
 - (1) Unless otherwise noted on the Drawings, openings in existing structures to allow for connection of mains shall be core drilled, and the mains themselves shall be connected by use of watertight connections as specified in the Standard Specifications. Flow channels in the bottoms of existing structures shall be modified as necessary to provide smooth transition for incoming flow and/or orientation of mains. These modifications may include breaking out and reforming flow channels.
 - (2) Where mains, new and existing, are to intersect, dog house manholes shall be provided to facilitate connection and to gain access to the intersecting mains. Manholes shall be provided at the manufacturing plant with arched openings in lower barrel section to span each of the intersecting mains. Reinforcing shall be cut and bent back. In the field, manhole shall be set on concrete blocks, with reinforcing provided according to Drawings 01-975-41A or 01-975-43A for the bottom slab. Concrete shall be poured under and around the manhole to seal all openings, cover and adhere to the slab and bent reinforcement, and provide for benches or fillets in the manhole. Sanitary and storm sewer mains shall be kept intact until the bench or fillet is

poured. Then the top of pipe to springline shall be removed to provide access.

16. Valve Boxes: The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.
17. Yard Hydrants: Yard hydrants shall be set on a slab of concrete at least 1 cubic foot in size and against a 3-cubic-foot minimum concrete brace laying against undisturbed earth. Backfill at base of hydrant shall be 1 cubic yard of coarse gravel. It shall be the responsibility of CONTRACTOR to set the hydrants at to the proper grade. Extensions or fittings shall be provided as required.
18. Trench drains, channel, and grates shall be installed according to manufacturer's requirements. Place minimum 4 inches of concrete beneath and on each side of channels.

3.02 FIELD QUALITY CONTROL

- A. CONTRACTOR shall include the cost of all televising, testing, cleaning, and disinfection in the price bid.
- B. Work shall be tested as specified in this section. Unless indicated in writing before testing begins, tests shall be witnessed by ENGINEER and others as necessary. Test results shall be recorded, and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.
- C. New piping shall be tested. Prior to conducting the pressure and leakage test, CONTRACTOR shall backfill the trench for its full depth. All bends and special connections to the main shall be adequately blocked and tied prior to the test. Any damage caused to the main or its appurtenances during performance of these tests shall be corrected by CONTRACTOR at its expense. Should underground piping fail test, CONTRACTOR shall be responsible for removal and replacement of backfill, and relay new pipe if necessary, to repair the defective pipe. Under no circumstances shall defects be sealed from the interior of the pipe, and only where specifically allowed by ENGINEER, shall defects be sealed from the exterior of the pipe. Piping, interior or exposed, shall be subject to test before being covered with insulation or paint. Piping and appurtenances shall be watertight or airtight and free from visible leaks. Manholes and appurtenances shall be free of any visible leaks. Any leakage shall be sealed by methods acceptable to OWNER, from the exterior of the manhole or structure. Precast reinforced concrete manhole risers and tops shall be tested in accordance with ASTM C497.
- D. Piping shall be flushed or blown out after installation prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.
- E. Pressure Tests:
 1. Pressure tests shall be performed as required by AWWA C600 and AWWA C605, unless otherwise noted herein.
 2. When test medium for piping is water, all air shall be removed from piping by flushing, opening vents, loosening flanges, utilizing equipment vents and/or installation of

corporations at high points in system. Test pumping equipment used shall be centrifugal pumps or other pumping equipment that will not place shock pressures on the main. Power plunger pumps will not be permitted for use on closed pipe systems. Pumps shall be disconnected during test periods. Presence or absence of air will be determined during pressurization of the piping system.

3. The test pressure in all lines shall be held for two hours, during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.
4. During performance of the hydrostatic pressure test, water main shall be subjected to a minimum pressure of at least 50% above normal working pressure with a minimum pressure 125 psi. Force main shall be tested to 200% of normal operating pressure in the main, but to no more than the pressure rating of the pipe.
5. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.
6. Where connections are made to existing mains, it shall be the responsibility of CONTRACTOR to provide the necessary hydrostatic tests on all new mains installed. This may necessitate, but is not limited to, the installation of temporary valves and restraint to isolate the new system from the existing system. All materials, Work, and equipment necessary for this Work shall be furnished by CONTRACTOR at its expense.
7. All testing of pipelines shall proceed concurrently with installation. CONTRACTOR is encouraged to conduct daily preliminary testing of its Work.
8. Water from disinfection testing shall not be discharged to a stream, creek, river, storm sewer tributary thereto, or to a navigable water without first neutralizing the chlorine residual in the water and complying with local, state, and federal laws thereto.
9. Gauges used for testing shall have increments as follows:
 - a. Tests requiring a pressure of 10 psi or less shall use a testing gauge having increments of 0.10 psi or less.
 - b. Tests requiring a pressure of greater than 10 psi by less than or equal to 100 psi shall use a testing gauge having increments of 1 psi or less.
 - c. Tests requiring a pressure of greater than 100 psi shall use a testing gauge having increments of 2 psi or less.

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
PW	150	Water	"A"

Note: Leakage allowance designation "A" shall mean not more than 0.002 gallons per hour per inch diameter per 100 feet of buried pipe for all piping except buried mechanical joint or push-on joint pipe.

F. Infiltration/Exfiltration Tests:

1. Leakage Testing:
 - a. All sanitary sewer gravity mains and drains shall be tested for leakage after installation of laterals and placement of backfill. Leakage testing of thermoplastic and iron sanitary sewer gravity mains shall be conducted in accordance with ASTM F1417. Testing of clay sanitary sewer mains shall be in accordance with ASTM C828. Testing for concrete sanitary sewer mains shall be in accordance

with ASTM C1214. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.

- b. Sewers 18 inches and larger may be tested for leakage by infiltration or exfiltration in lieu of vacuum testing. Concrete pipe shall be tested per ASTM C969 except as modified herein. If groundwater is 2 feet or more above the sewer, measurements will be taken to determine the rate of infiltration into the sewer. If groundwater is below 2 feet above the sewer, the stretch of sewer shall be plugged at its downstream end and water shall be placed inside the sewer to provide a minimum of 4 feet of head above the upstream end.
- c. Measurements will then be taken to determine the rate of leakage out of the sewer. CONTRACTOR shall furnish all labor and materials necessary for making the tests. The allowable leakage shall be as indicated below for final acceptance.
- d. At the conclusion of construction and before final acceptance of the Work, the downstream end of all sanitary sewer will be measured for infiltration. Allowable infiltration shall not exceed 100 gallons/inch of pipe diameter/mile/day for that portion of the Work under groundwater. If infiltration is exceeded, the leak or leaks shall be located and repaired.
- e. CONTRACTOR shall prepare all pipeline for testing and shall furnish all equipment, materials, tools, and labor necessary for performance of the tests. Equipment for the low pressure air test of gravity mains shall be equal in all operational aspects to that as furnished by Cherne Industries, Inc., United Survey, or equal.
- f. Test apparatus and gauges shall be located such that ENGINEER or OWNER do not have to enter a confined space to verify readings.
- g. Air and leakage testing of storm sewers will not be required.
- 2. Deflection Testing:
 - a. All PVC pipe used for sanitary sewer shall be tested for vertical deflection. Maximum deflection after completion of backfilling shall be 5% of the inside pipe diameter. Testing shall not be started until trench backfill has been in place for 30 days. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results. Deflection shall be measured by pulling a mandrel with a vertical diameter equal to 95% of the pipe inside diameter through the line, after thoroughly flushing the lines to be tested. The testing device shall be controlled using cables at both the upstream and downstream manholes. The testing device must pass freely through the sewer without the use of unreasonable force on the control cables. Any line that will not pass the test cylinder will not be accepted until the faulty sections have been removed and replaced and the line retested.
 - b. Deflection testing of thermoplastic storm sewer shall be provided in accordance with the above requirements.

3.03 DISINFECTION

- A. CONTRACTOR shall disinfect and flush the potable water system before it is put online. Water main shall be disinfected according to AWWA C651.
- B. In accordance with the requirements of AWWA C651, at least one set of samples shall be collected from every 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch.

- C. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria in accordance with Option A of Section 5.1 of AWWA C651. Copies of test results shall be submitted to OWNER and ENGINEER.
- D. CONTRACTOR shall furnish all water and other materials, equipment, and labor necessary to disinfect all new water mains and all existing water mains disturbed by construction. CONTRACTOR shall notify ENGINEER to observe disinfection test and shall coordinate and bear cost for necessary laboratory testing and shall provide safe bacteriological sample results to OWNER prior to placing the water main in service. Sampling and testing shall be scheduled to complete the Work within the Contract Times. Items of material for testing shall be furnished in the size and quantity necessary to properly complete the test. Interruption or delay of CONTRACTOR's Work progress caused by testing and sampling shall not be cause for extra payment under the Contract nor shall they be cause for extension of Contract Time.
- E. Water main shall be disinfected according to the Standard Specifications for Water and Sewer Main Construction in Illinois, which shall include initial flush and disinfection to 50 ppm with gaseous chlorine or other acceptable methods. Acceptable concentration after 24 hours shall be 25 ppm. Satisfactory disinfection shall be demonstrated in accordance with the requirements of 35 Ill. Adm. Code 652.203.

3.04 CLEANING

- A. All equipment and materials shall be clean before installation.
- B. Upon completion of the work, all improvements disturbed by CONTRACTOR's operations shall be repaired or replaced. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.
- C. All waste disposal areas and all areas used for the storage of materials or the temporary deposit of excavated earth shall be leveled off, cleaned up, and returned to condition that existed prior to construction.
- D. All pipes and manholes shall be flushed until clean, and all debris and mud shall be removed.

END OF SECTION

SECTION 40 05 00

PIPING AND APPURTENANCES

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. All piping, valves, and appurtenances of every description except for pipe as specified in Divisions 22, 33, 43, and 46, natural gas piping and appurtenances as specified in Section 23 11 23—Facility Fuel Gas Piping.
 - 2. Concrete foundations and anchor bolts for all equipment furnished under this section.
 - 3. Piping connections to all equipment, whether furnished under this section or not.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Applicable provisions of Section 01 33 00—Submittals cover requirements for shop drawings and Operation and Maintenance Manuals.
- B. General arrangement drawings, including support system of 3 inches or larger interior and 3 inches or larger exterior (aboveground) ductile iron and CPVC piping shall be submitted to ENGINEER for approval. Shop drawings for all interior and aboveground exterior piping shall be two-line drawings drawn to scale. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, supports, and valves and appurtenances. Plug valve orientation, including operator and plug orientation, shall be shown on Drawings.
- C. Grooved joint couplings and fittings shall be referred to on arrangement drawings and product submittals, and be identified by the manufacturer's listed model or series designation.
- D. Refer to Division 22 for DWV and potable water piping and valves.

1.03 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de

minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2-PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

- A. Materials of Construction: All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. Products used in potable water systems shall be UL classified in accordance with ANSI/NSF-61 for potable water service and shall meet the low-lead requirements of NSF-372.
- B. Size and Type:
 - 1. All materials shall conform to the size and type shown on the Drawings or called for in the specifications.
 - 2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be selected by CONTRACTOR and submitted for review by ENGINEER.
- C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be subject to approval of ENGINEER. All grooved joint couplings and fittings shall be of the same manufacturer.

2.02 PIPE AND PIPE FITTINGS

- A. Ductile Iron Piping and Fittings:
 - 1. Unless otherwise shown or specified, all interior piping 4 inches in diameter or larger shall be ductile iron conforming to AWWA C151.
 - 2. Interior piping shall be minimum Special Class 53 with a minimum rated working pressure of 250 psi.
 - 3. Except where shown, interior pipe joints shall be flanged. Flanged joints shall conform to applicable flanged joint sections of AWWA C110, C111, and C115 and shall be compatible with ANSI B16.1 Class 125. Flanges shall be ductile iron. Manufacturers of flanged pipe and fittings shall be certified to NSF 61 by an ANSI-accredited third-party certification organization.
 - 4. Gaps between flanges and all locations where a gap exists at flange hub/pipe intersection shall be caulked prior to finish painting with Sonneborn NP-1 by Sonneborn-Chem Rex, Inc., Sika FLEX 1-A, or equal. CONTRACTOR shall verify compatibility of caulk with finish painting system specified in Division 09. Caulking shall be completed following installation and testing. Trim back excess edge of rubber gasket between flanges as necessary to achieve a uniform and flush caulk joint, but no more than 1/8-inch from outside edge of flange. Caulking shall be done and fully cured as required prior to painting of piping.
 - 5. Flanged gaskets shall be minimum 1/8-inch-thick, styrene butadiene rubber (SBR), full-face, Toruseal, Flange-Tyte, Maloney, or equal, gaskets. Thicker gaskets shall be provided as recommended by the manufacturer to meet joint tolerance.

6. Flange bolts, nuts, and fastening hardware installed in wet wells, valve manholes, and other submerged locations shall be 316 stainless steel. In other locations, flange bolts, nuts, and fastening hardware shall be standard zinc-plated steel. All flange bolts shall have hex head and hex nuts rated for the working pressure and installation conditions specified or shown.
 7. Flanged fittings shall be of ductile iron with ductile iron flanges. Flanged fittings shall conform to AWWA C110 and ANSI B16.1, as applicable, with a minimum rated working pressure of 150 psi.
 8. All ductile iron fittings shall be American Ductile Iron Pipe, Tyler Union, U.S. Pipe, or equal.
 9. All flanged sections of pipe shall be made up in accordance with AWWA C115 specifications. No field makeup flanges will be allowed unless approved in advance by ENGINEER and strictly conforming to AWWA C115, with facing done after turning pipe through flange.
 10. Unless otherwise specified, all ductile iron piping and fittings shall be cement mortar lined and asphaltic-coated inside. Cement mortar lining shall be in accordance with AWWA C104. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings. Exterior exposed, submerged, and interior piping shall be furnished with outside surfaces prepared by abrasive blasting in accordance with NAPF 500C-03. Cleaned surfaces shall then be shop-primed. Factory shop prime with one coat of Tnemec N69 or N140 or Sherwin Williams Duraplate 235 or Macropoxy 646PW, or equal, applied at a minimum 5.0 mils dry film thickness. Primer color shall be beige. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all piping, supports, and appurtenances shall be furnished shop-primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.
 11. Unless otherwise specified, piping and fittings in manholes and wet wells shall be as furnished above for exterior exposed and interior piping.
- B. Copper Piping:
1. Copper piping shall conform to the requirements of ASTM B88.
 2. All interior or aboveground non-potable water supply piping smaller than 3 inches shall be Type K hard copper. Fittings shall conform to ANSI B16.22 wrought copper and be soldered or sweated on. No lead-based solder may be used. Piping shall run exposed in buildings, except in finished areas.
 3. Shutoff valves shall be placed on each branch for all underground, aboveground, or interior piping.
 4. Pump vent and drain lines, seal water supply and other small-diameter interior piping from the PW or NPW source, and manometer lines shall be rigid, Type K hard copper. An ample number of unions shall be provided for disassembling. Pump vents shall be valved.
- C. Galvanized Iron Piping: Unless otherwise shown or specified, all piping 3 inches and smaller than shall be extra strong galvanized iron pipe, with Class 300 galvanized malleable iron fittings. An ample number of unions shall be provided for disassembling pipe. Pipe shall conform to the "Specifications for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses," ASTM A53.
- D. CPVC Piping:
1. Sodium Hypochlorite (SH) chemical piping and carrier piping shall be CPVC.

2. CPVC material used in manufacturing piping and fittings shall conform to ASTM D1784, Class 23447.
 3. CPVC piping shall be CPVC 4120, Schedule 80, high-impact conforming to ASTM F441. Piping and fittings shall be approved for use by the National Sanitation Foundation. All pipe delivered to the jobsite shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided as required. In general, all joints shall be solvent weld. All piping shall be supported at spacing not exceeding that recommended by the manufacturer.
 4. Solvent cement for CPVC piping shall be specifically designed for piping systems receiving chemical resistance. Cement shall be Oatey EP42, IPS Weld-On ZZ724, or equal.
 5. CPVC Schedule 80 pressure fittings shall meet requirements of ASTM F437 (threaded type) and ASTM F439 (solvent weld socket type). All internal threads shall be machine-taped to the requirements of ANSI/ASME B1.20.1. The quick burst strength of the fittings shall be equal to or greater than the burst strength of the equivalent Schedule 80 CPVC pipe. Fittings shall be made of CPVC 23447-B, or better.
 6. All exterior or CPVC piping in open tanks shall be formulated with sufficient ultraviolet light screeners to provide for long-term outdoor exposure with no deleterious effects.
- E. Polyethylene Tubing: Chemical tubing shall be polyethylene tubing, unless otherwise shown or specified. All tubing bends, tees, adapters, and unions shall be clear and compatible with the tubing and solution, or equal. Tubing inserts shall be used at all fittings. Tubing and fittings shall be rated for operating pressures of 120 psi, minimum. Tubing runs in excess of 10 feet shall be run in adequately supported minimum 2-inch ID Schedule 40 PVC conduits. Conduit runs shall be broken at all fittings and bends to allow easy access to interior tubing. Conduit shall be supported as specified for PVC piping.
- F. Flexible PVC Piping:
1. Flexible hose connections between chemical injection points, and rigid chemical feed piping shall be Series K3280 Reinforced PVC Flexible Connection Hose, as manufactured by Kuriyama of America, Inc., or equal.
 2. PVC hose shall have a maximum working pressure of 125 psi at 150°F.
 3. Hose shall be clear and compatible with chemicals being used.
 4. All hoses shall be provided with suitable fittings and connectors to connect hose to tanks and rigid piping. Fittings and connectors shall be compatible with chemicals being used.
 5. Hose shall be certified under NSF/ANSI Standard 61.

2.03 VALVES

- A. Gate Valves:
1. Shutoff valves in potable and non-potable water lines 4-inch diameter and larger shall be AWWA C515, ductile iron, resilient seat, nonrising stem, 150 psi working pressure with O-ring packing box, Kennedy, American, American AVK, or equal.
 2. Asphaltic varnish and coal tar coating are not allowed on interior valves. Exterior buried valves shall be fusion-bonded epoxy-coated or epoxy-coated (prime and finish coats) as specified in Division 09. Interior and exterior exposed valves shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the valve once assembled. Cleaned surfaces shall then be shop-primed. Factory shop prime with one coat of Tnemec N69 or N140 or

Sherwin Williams Duraplate 235 or Macropoxy 646PW, or equal, applied at a minimum 5.0 mils dry film thickness. Primer color shall be beige. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. A fusion-bonded epoxy system is an acceptable alternative to the specified primer. It is the intent of this specification that all valves, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.

B. Check Valves:

1. Except where noted, check valves in ductile iron lines carrying liquid shall be GA Industries 250-D, Apco Model 250 by DeZURIK, or equal, air cushion check valves. The swing check valves shall be constructed with a heavy cast iron or ductile iron body, a bronze or stainless steel seat ring, an extra heavy noncorrosive shaft for attachment of lever and necessary weights to close valve, and a complete noncorrosive air cushion chamber. The valve shall be tight-seating and shockless in operation. The seal ring shall be renewable and shall be securely held in place by a threaded joint. The air cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any slamming action. Shock absorption shall be by air, and the chamber shall be so arranged that the closing speed can be adjusted to meet the service requirements. The valve disc shall be of cast iron or ductile iron and shall be suspended from a noncorrosive shaft that shall pass through a stuffing box to be connected to the chamber on the outside of the valve.
2. Miscellaneous:
 - a. Check valves in other than ductile iron, cast iron, PVC, polyethylene, or compressed air lines shall be Class 150, Milwaukee Valve 510, Nibco T-433, or equal, screwed end, bronze, bronze disc, swing check for water and air.
 - b. Check valves in PVC lines shall be ball check type of PVC construction.
 - c. Check valves in polyethylene lines shall be of polypropylene construction.
3. Asphaltic varnish and coal tar coating are not allowed on check valves. Exterior of cast iron or steel valve body shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the valve once assembled. Cleaned surfaces shall then be shop-primed. Factory shop prime with one coat of Tnemec N69 or N140 or Sherwin Williams Duraplate 235 or Macropoxy 646PW, or equal, applied at a minimum 5.0 mils dry film thickness. Primer color shall be beige. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. A fusion-bonded epoxy system is an acceptable alternative to the specified primer. It is the intent of this specification that all valves, supports, and appurtenances shall be furnished shop-primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.

C. Butterfly Valves:

1. General:
 - a. Except as otherwise specified or shown on the Drawings, shutoff valves in lines 4 inches in diameter or larger shall be butterfly valves.
 - b. Butterfly valves shall be AWWA C504, short body, Class 150B. Provide certified drawings by manufacturer and Affidavit of Compliance.

- c. Valve bodies shall be cast iron (ASTM A126, Class B), or ductile iron ASTM A536. Valves shall be flanged interior exposed and mechanical joint underground and conform to ANSI B16.1, Class 125.
 - d. Valve shaft shall be stainless steel.
 - e. Valve disc shall be cast iron.
 - f. Valve seat shall be constructed of synthetic rubber compound and shall be recess-mounted and bonded in the valve body or attached to the disc. Seat shall be mechanically attached to the valve body or seat with screws, bolts, clamping-rings, or similar devices.
 - g. Valve shaft bearing shall be self-lubricating Teflon, nylon, or bronze.
 - h. Shaft seals shall have split V-type packings that are replaceable without removing the valve from the line.
2. Standard Operators:
- a. Except as noted below, butterfly valves shall be equipped with top-mounted handwheel operators with totally enclosed, sealed and lubricated gear boxes.
 - b. The rated torque capability of each operator shall be sufficient to seat, unseat, and hold any valve disc position with the maximum pressure differential across the valve without creep or fluttering.
 - c. Exposed valves shall be equipped with handwheels and valve disc position indicators, and shall be equipped with field-adjustable mechanical stop limiting devices. Handwheels shall be ductile iron or gray iron.
 - d. Valves for buried service shall be furnished with 2-inch-square wrench nuts, extended stem, valve box, and key. Valve boxes shall be cast iron telescopic-adjustable as specified herein.
 - e. Valves installed over 6 feet above the floor shall be provided with chainwheel operators.
- D. Miscellaneous Valves, Strainers, Hose Bibs, and Valve Boxes:
- 1. Shutoff valves in non-potable water lines smaller than 1 inch shall be Nibco T-585 (threaded), Nibco S-585 (solder joint), or equal, full port ball valves. Provide extended stems for valve operators installed with insulated pipe.
 - 2. Shutoff valves in PVC piping shall be hand-operated 150 psi union-type PVC ball valves, Chemtrol TU Series Tru-bloc, Walworth Series 8927, or equal. Valves and all components including O-rings shall be compatible with chemicals in piping. PVC valves and union shall not be painted. Valves in sodium hypochlorite piping shall be fitted with a relief hole from center port to high pressure side of valve.
 - 3. Y-strainers in potable and service water piping shall have cast bronze bodies, stainless steel 20 mesh screens, Watts, LF777 or LFS777, or equal. Y-strainers in chemical lines shall be transparent PVC, Asahi, or equal, True Union strainer. Provide 20 mesh PVC mesh screens. Strainers used for hypochlorite service shall have Teflon O-rings.
 - 4. All valves for use on chemical waste lines shall be chemically compatible with the liquid to be carried. Valves in polyethylene piping shall be 1/2-inch polypropylene ball valves suitable for 100 psi operating pressure. Valves in PVDF piping shall be PVDF valves suitable for 200 psi operating pressure.
 - 5. Hose Bibs:
 - a. Hose bibs providing non-potable water shall be provided with a removable key handle.
 - b. Exterior hose valves shall be Woodford Model 65, Watts, or equal, freezeless wall hydrants with integral ASSE 1019 backflow preventer outlet, permanent valve seat, and brushed chrome exterior face with 3/4-inch outlet garden hose threads and 3/4-inch inlet. Provide loose key operator with each exterior hose bib. Provide round

- or square box recessed enclosure with locking door for the hose bib. CONTRACTOR shall coordinate wall thickness with recessed enclosure depth.
- c. Interior hose valves shall be Woodford Model 24, Watts, or equal. Provide 3/4-inch garden hose thread, 3/4-inch inlet, and ASSE 1011 approved backflow preventer outlet. Interior hose valves shall be equipped with approved vacuum breaker, Watts 8A, Nidel Model 34H, or equal. Provide metal handle and chrome plate finish. Provide loose key with each faucet.
- 6. Valve Boxes:
 - a. Valve boxes shall be provided for all buried valves.
 - b. Valve boxes shall be made of cast iron conforming to ASTM A48, Class 20. Valve boxes shall consist of a base section, tubular mid and top sections, both with cast threads by which one can be telescoped on the other, extension sections if required, and a circular drop cover. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall have a normal smooth casting finish. The castings shall be thoroughly coated with a 1 mil minimum thickness bituminous coating. Valve boxes shall be 5 1/4 inches in diameter. Valve boxes shall have a maximum length of 7 feet when extended without extension sections. Extensions shall be provided for deeper mains.
 - c. The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.
 - d. Valve box alignment devices: All valves shall be supplied with a gate valve adaptor as manufactured by Adaptor, Inc., or equal. All adaptors shall have a metal frame and be supplied with a 3/4-inch rubber gasket. All adaptors shall be sized to fit the brand of valve being supplied.
- 7. Water Air Release Valve:
 - a. The air release valve shall be 1-inch APCO Model No. 50, Val-Matic No. 15A, or equal.
 - b. The valve assembly shall be installed as shown on Drawings.
 - c. CONTRACTOR shall run 1/2-inch pipe from the top of the valve as shown. Screen end of pipe.
- 8. Shutoff valves in potable water lines smaller than 1 inch shall be Milwaukee UP105 (threaded), or Milwaukee UP115 (solder joint), Nibco T-113-LF (threaded), or Nibco S-113-LF (solder joint), or equal, bronze 300 psi gate valves.
- E. Ground Level Reservoir High Zone Influent Fill Flow Control Valve (FCV-15-01): The 8-inch electronic control valve shall be installed as shown on the Drawings. The valve shall be designed for the following functions:
 - 1. Valve shall be controlled from an Electronic Valve Controller, Cla-Val Model VC-22D. 24 VDC will be provided to the controller from the East Receiving SCADA Panel. Controller shall be programmed to provide the following controls:
 - a. Refer to the Section 26 09 90– SCADA I/O listing for signals that shall be provided to or received from the SCADA System by the electronic valve controller.
 - b. Controller shall provide loop power to the valve position transmitter (ZT-15-01) and accept the 4-20 mA position feedback signal from the transmitter. The controller shall provide a 4-20 mA output duplicating the feedback signal for interface with the SCADA System.
 - c. Power to Solenoid Valves SV-15-01 and SV-15-02 shall each be 24 VDC from the controller and shall be fused.

- d. When the Auto Mode signal from the SCADA System is active, the valve shall operate as follows:
 - (1) When the Open signal from the SCADA System is active, the controller shall fully open the valve. The valve shall remain opened until the signal from the SCADA System is deactivated.
 - (2) When the Close signal from the SCADA System is active, the controller shall fully close the valve. The valve shall remain closed until the signal from the SCADA System is deactivated.
 - (3) When the Reservoir Full signal from the SCADA System is active, the valve shall close.
 - (4) When the Reservoir OK to Fill signal from the SCADA System is active, the valve shall open and the controller shall modulate the valve to maintain the flow through the (FIT-15-06) at the Reservoir Fill Flow setpoint received from the SCADA System.
- e. Controller display shall be configured to show FCV-15-01 and associated piping graphically, the status of the open and close solenoids, the position of FCV-15-01 based on the position feedback signal, the Reservoir Fill Flow setpoint received from the SCADA System, the actual reservoir filling flow received from the SCADA System (FIT-15-06), and the status of the Reservoir Full and Reservoir OK to Fill signals from the SCADA System.
- f. Controller shall be configured to provide a dry-contact output to the SCADA System when the valve is called to open but does not open within a time delay. Indication of "Valve Not Opening" shall be provided at the SCADA System.
- 2. Valve shall contain a diaphragm-actuated "main" control valve and shall consist of all necessary mechanical and electrical accessories to adjust the main valve to achieve the previously described functions. The main valve shall be a hydraulically-operated, diaphragm-actuated, reduced internal port size, globe pattern valve manufactured of ductile iron in accordance with ASTM A536.
- 3. Main valve shall contain a resilient synthetic rubber disc forming a tight seal against a single removeable seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. All necessary repairs shall be possible without removing the valve from the line.
- 4. Valve shall be an 8-inch, 131 series, globe-pattern valve with stainless steel trim, epoxy coating inside and out, flanged, 150 Class, as manufactured by Cla-Val Co., or equal, with standard pressure adjust ratings.
- 5. Manufacturer of valve shall confirm model number and valve specifications to written description above and shall submit a letter with shop drawings stating the valve will function as intended under the conditions shown on the Drawings.

2.04 PIPING APPURTENANCES AND MISCELLANEOUS MATERIALS

- A. General: Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be subject to approval of ENGINEER.
- B. Rubber Expansion Joints: Rubber expansion joints shall be furnished and installed where shown on the Drawings and where required to eliminate vibration from equipment to piping. Expansion joints shall be the single filled-arch type as manufactured by the Mercer Rubber

Company, Series Style 450 or 500; General Rubber Corporation; 1100 Series, or equal. Unless otherwise specified, expansion joints shall be provided complete with stainless steel control rods, rubber washers, stainless steel nuts, and jamb nuts, as required. Control rods shall be provided to prevent over-stress on coupling at a minimum of twice the system test pressure. The number and size of the control rods shall be sufficient for twice the test pressure, two rods minimum. CONTRACTOR shall provide tie ears to secure control rods to flanges where necessary. Expansion joints shall have integral duck and rubber flange with split backup rings and have a minimum rated working pressure of 150 psi and 20 inches Hg vacuum. Joints shall be provided with higher rated working pressures, if required to meet specified test pressures. Joints shall have a nominal laying length of 6 inches for joints sized up to 8 inches in diameter, 8 inches for joints sized up to 20 inches in diameter, and 10 inches for joints sized up to 36 inches in diameter. Tube and cover shall be of butyl rubber.

- C. **Restrained Flanged Coupling Adapters:** Restrained flanged coupling adapters shall be furnished and installed as shown on the Drawings. Restrained flanged coupling adapters shall be of ductile iron construction, complete with EPDM sealing gasket, and gripping wedges and torque limiting actuating screws. Restrained flanged coupling adapters shall be Series 2100 MEGAFLANGE by EBAA Iron, or equal.
- D. **Tension Ties:** All tension ties and rod ties shall be provided to resist a minimum 150 psi pressure in the pipe line. CONTRACTOR shall provide tie ears to secure tension rods to flanges where necessary. Rods shall be provided with nuts and washers on both sides of tie ears. All nuts, washers, and rods shall be Type 304 stainless steel. Rods shall be Type 304 stainless steel at a minimum. Tie rods shall be equally spaced around pipe. The following table lists the minimum number and diameter in inches for the tie rods for various sizes of pipe.

Pipe Size (inches)	150 psi Pressure		250 psi Pressure	
	Minimum Number	Minimum Size (inches)	Minimum Number	Minimum Size (inches)
4-10	4	5/8	4	5/8
12	4	5/8	4	3/4
14	4	3/4	4	7/8
16	4	3/4	4	1
18	4	7/8	4	1 1/8
20	4	1	4	1 1/4

- E. **Floor Boxes:** Provide floor boxes in concrete floors or slabs and as shown on the Drawings. Floor boxes shall be Neenah R-7506-B, or equal. CONTRACTOR shall verify that all floor boxes are large enough to accommodate all operating nuts and wrenches. Provide one "Tee" valve key operator for each valve manhole and one for each tank with tank or channel drain.
- F. **Mechanical Seals:** Mechanical seals shall be 316 stainless steel Link Seal, Innerlynx by APS, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer.

- G. Pressure Gauges: Provide a pressure gauge on each new pump discharge piping at suction and discharge of all centrifugal pumps. Pressure gauges shall be Ashcroft, or equal, and shall have scale in psi with a maximum range equal to twice the normal operating pressure indicated in the submersible pump equipment specifications. Provide compound gauges at pumping station. Gauges shall have 4-inch minimum diameter stainless steel case, shall be connected to a mineral-oil filled diaphragm housing to separate the gauge from liquid in discharge line, and shall have accuracy of $\pm 1\%$. Provide isolation valve and union at connection to pipe to allow the gauges to be removed while the line is under pressure.
- H. Equipment–Pressure Gauges:
1. Low and High Zone pump suction pressure gauge graduated in psi, range 0 to 30 in Hg, and 0 to 100 psi.
 2. Low and High Zone pump discharge pressure gauges graduated in 0 to 100 psi.
 3. High Zone influent pressure gauge graduated in psi, range 0 to 100 psi.
 4. Grand Prairie Water Commission influent pressure gauge graduated in psi, range 0 to 100 psi.
- I. Flange Insulating Gasket Kits: Gaskets located immediately downstream of well pump discharge flanges shall be Type F insulating gaskets as manufactured by Advance Products and Systems. Gaskets shall be plain-face and come with insulating sleeves and washers manufactured of high-density polyethylene. A 1/8-inch-thick S.A.G. electroplated steel washer shall be provided to protect insulating washer. A full kit shall be provided as necessary.
- J. Service Saddle: Service saddles shall have a ductile iron body per ASTM A536 and have two carbon steel bales. Bales, washers and nuts shall be electro-galvanized with dichromate seal. Gasket shall be of Nitrile rubber and NSF61 listed. Saddle shall be Smith-Blair, Style 313, or equal.
- K. Tapping Sleeve: Tapping sleeve body and neck shall be made of heavy 18-8 Type 304 stainless steel. Flange, studs, nuts and washers shall be Type 304 stainless steel. Gasket shall be 1/4-inch thick, gridded and have a molded outlet ring to provide effective sealing. It shall be SSF 61-G Nitrile. All welded stainless steel surfaces shall be fully passivated. Sleeve shall be Smith-Blair Style 663, or equal.
- L. Sampling Taps: All taps that are required in new piping shall be provided with a boss and tap. Sample tap piping shall be 316L. Provide an isolation valve immediately downstream of tap. Valve shall be of same body material as sample piping. Tap and valve shall be 5 feet or less above finished floor.

PART 3–EXECUTION

3.01 GENERAL

- A. Refer to requirements specified in Division 01 for equipment installation, quality control, testing, supervision, start-up, and operator training.

3.02 INSTALLATION

A. Interior or Exposed Piping:

1. Provide pipe supports for all piping. Pipe support spacing and type shall, at a minimum, conform to manufacturer's recommendations unless more restrictive requirements are specified or shown on the Drawings. All interior or exposed pipelines shall be securely supported by adjustable saddles, brackets, or adjustable hangers supported directly by concrete, masonry work, or tile. Strap hangers, tin clips, or U-hooks will not be acceptable. Piping shall be supported, even though not shown on the Drawings, using base fittings and concrete pads to 6 inches above the floor, Anvil 264, B-line, or equal, adjustable pipe saddle stand with floor flange to 6 feet above the floor, and supporting clamps or inserts more than 6 feet above the floor. In general, the maximum spacing of supports shall not exceed 10 feet on center. Except as specified for plumbing system, all PVC piping shall be supported using galvanized supports for flexible piping except as indicated. Piping shall be adequately supported and braced to resist thrust at bends, rubber expansion joints, and joints. Insulation saddles shall be used at supports of insulated piping. CONTRACTOR shall furnish and place hangers, supports, wall pipes, and sleeves in the forms before concrete is poured where needed or shown on the Drawings.
2. All piping shall be adequately supported and braced to resist thrust at bends, expansion joints, and joints. Use base elbows, poured concrete, or rod ties. The weight of the piping shall be supported independently of connected equipment.
3. All supports and parts shall conform to the latest requirements of ASME B31 and shall have a structural safety factor of 5. Accurate weight balance calculation shall be made by CONTRACTOR to determine the required supporting force at each hanger location and the pipe weight load at each equipment connection. CONTRACTOR shall be responsible for the installation of the supports. Pipe hangers shall be capable of supporting the pipe weight load in all conditions of operation. The hangers shall allow free expansion and contraction of the piping to prevent excessive stress in the piping. Where vertical movement up to 1/8 inch is anticipated, a precompressed variable spring support shall be used. Rigid hangers shall be provided with a means of vertical adjustment after erection. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from vertical is greater than 4 degrees from hot to cold position of the pipe, the hanger pipe and structural attachments shall be offset in a manner that the rod is vertical in the hot position. Hangers and supports shall be spaced in accordance with ASME B31 and as indicated in this specification. Pipe supports shall be placed before and after a valve, expansion joint, or equipment so stress will not be transferred to them.
4. CONTRACTOR shall provide calculations of pipe supports if requested by ENGINEER.
5. All carbon steel parts shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation of all carbon steel parts shall be performed at such time during the assembly process as to preclude damage to the equipment once installed and assembled. Cleaned surfaces shall then be shop-primed. Factory shop prime with one coat of Tnemec N69 or N140 or Sherwin Williams Duraplate 235 or Macropoxy 646PW, or equal, applied at a minimum 5.0 mils dry film thickness. Primer color shall be beige. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.
6. The following maximum spacings shall be provided for supports:

MAXIMUM HORIZONTAL PIPE HANGER AND SUPPORT SPACING

Nominal Pipe or Tube Size	Copper Tubing		Ductile Iron (See Note 1) ft	PVC/CPVC Pipe (See Note 2) ft
	Water Service ft	Vapor or Air Service ft		
1/4	5	5		
3/8	5	6		Continuous
1/2	5	6		Continuous
3/4	5	7		Continuous
1	6	8		4
1 1/4	7	9		4
1 1/2	8	10		4
2	8	10		4
2 1/2	9	10		4
3	10	10		4
4	10	10	10	4
5	10	10	10	4
6	10	10	10	9
8	10	10	10	9
10	10	10	10	10
12	10	10	10	10
14			10	10
16			10	10
18			10	10
20			10	

Note 1: Provide at least one hanger per pipe length located as close to the flange or joint on barrel as possible.

Note 2: Spacing is based on Schedule 80 at 100°F. For Schedule 40 or higher temperatures, provide shorter span. Consult local plumbing code and manufacturer's recommendations as required. Minimum spacing requirements shall govern.

7. The length of hanger span and support spacing in the above table refers to straight lengths of pipe. When there are changes of direction in pipe, two supports shall be placed less than three-fourths the full span in the table. When practical, a hanger shall be located immediately adjacent to a change in direction of piping. Where there are concentrated loads between supports such as valves, spacing shall be based on load calculations rather than this table.
8. Provide saddles or shields under or around piping between hanger and supports for all insulated piping to prevent crushing of insulation. Provide stainless steel pipe shields under aeration stainless steel piping to prevent indentation of piping from the support or clamp.
9. Spacing for stainless steel air piping supports shall be a maximum of 16 feet for 6-inch diameter and above piping. Pipe slides, Anvil Figure 257, Type 3, B-line, or equal, in stainless steel shall be used on pipe support brackets where movement due to pipe

expansion is anticipated. Expansion joints shall be used to prevent excessive pipe stress. Clamps or supports in contact with the stainless steel piping or as indicated shall be stainless steel.

10. Anchored supports shall include a stainless steel U-bolt and nuts bolted to the wall bracket.
11. Exposed piping shall run straight, in neat parallel lines, and shall be located far enough from walls, ceilings, and floors to permit access for covering of pipe and painting work. Care shall be taken in laying out piping so that there is no interference with the proper location of piping for other purposes or other equipment and shall be run with regard to the requirements of each service.
12. Piping shall not interfere with headroom or clear floor space. Unless otherwise shown, piping shall run exposed in buildings, except in finished areas. Unless otherwise shown, small water piping in finished areas shall be concealed in interior walls, above suspended ceilings, or under floors where possible. Water piping shall not be installed in exterior walls, unless otherwise shown or noted on the Drawings. Joints shall not be used under floor slabs. Unless otherwise shown, piping under floor slabs shall clear floor slabs or footings by a minimum of 6 inches. Pipes under floors shall have a minimum of 6 inches of sand cover. Plates shall be provided on all uncovered pipes passing through floors, walls, and ceilings constructed of materials other than poured concrete. Plates shall be on exposed sides and shall be chrome-plated, spring and snap type.
13. Except for flanged piping, an ample number of standard weight ground joint unions and a shutoff valve shall be provided in all pipelines and at all equipment. CONTRACTOR shall provide 3/8-inch tapped and plugged connections in suction and discharge of all pumps for testing.
14. Valves shall be located on all branches of water supply lines where shown on the Drawings. Position valves to facilitate access and operation.
15. The appropriate number, size, and lengths of spool pieces and flange fillers needed for plumbing and leveling any existing piping shall be included in the price bid.
16. Plug Valve Installation: On clear liquids and on lines carrying solids where neither side of the pipeline drains, the valve shall be positioned so that the seat end of the valve is downstream of the shutoff pressure. The highest pressure should always be on the back side of the plug, except for a valve installed in a vertical pipe. On sludge or slurry lines where one side of the line normally drains, it is preferential to install the seat end of the valve upstream so that the valve cavity drains empty. Where possible in horizontal pipelines, the valve shall be installed with the axis of the plug horizontal and the plug in the top of the valve when in the open position. In vertical pipelines carrying sludge or slurries, the seat end shall be at the top of the valve. Valve installation shall be in accordance with manufacturer's requirements.
17. All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every 10 feet (3 m) and with at least two labels in each room, closet, or pipe chase. Color-coding shall also be used.

B. Wall and Other Pipe Penetrations:

1. CONTRACTOR shall furnish and place hangers, supports, wall pipes, sleeves, and floor boxes in the forms before concrete is poured wherever needed or shown on the Drawings.
2. Where pipes pass through concrete members without wall fittings shown, CONTRACTOR shall provide sleeves in the forms for the piping, unless otherwise shown on the Drawings. The sleeve diameter shall not exceed the pipe o.d. plus 2 inches (or the pipe flange o.d. plus 1 inch, as applicable), unless otherwise shown on

Drawings. If the concrete members are to be watertight, the annular space around the pipe shall be sealed with a mechanical seal. Sleeves shall be steel unless noted otherwise and shall include minimum 1-inch waterstop. Steel sleeves shall be prepared, primed, and painted in accordance with Division 09 prior to placement in between concrete forms. Steel sleeves shall receive touch-up paint prior to placing forms. In lieu of steel sleeves, HDPE Infinity Wall Sleeves or Gal-vo-plast Wall Sleeves by APS, or equal. Each sleeve shall include integral waterstop. CONTRACTOR shall install sleeves in accordance with manufacturer's recommendation and no sleeve distortion or deflection will be allowed. For copper pipe, provide an elastomeric sleeve on pipe where it passes through walls or slabs.

3. Where plain end wall pipes are shown or indicated on the Drawings, CONTRACTOR may substitute a flanged end wall pipe, if desired, for the purposes of pressure testing specified herein.
 4. Where pipe passes through nonwatertight walls, the annular space shall be grouted full. Where pipes pass through nonwatertight floors, the sleeve shall extend 1 inch above the finished floor elevation. The annular space shall remain open, except the annular space between a rated space (example—Class I, Division 1, Group D hazardous location) and a nonrated space shall be sealed with a mechanical seal.
 5. Where new pipes go through existing watertight concrete members, CONTRACTOR shall core a hole through the member, unless otherwise shown on the Drawings. The annular space between the concrete and pipe shall be sealed with a mechanical seal. Where new pipes go through existing nonwatertight concrete or masonry members, holes shall be cored and annular space between the concrete and the pipe shall be grouted full (walls or floors at rated spaces) or remain open (floors at nonrated spaces). Prior to any coring, CONTRACTOR shall locate reinforcing steel in the member and shall consult with ENGINEER to determine optimal location for the core. Plug abandoned pipes and wall pipes, after pipe and fittings removal flush to the concrete surface, with nonshrink grout, to achieve a watertight seal.
 6. Where pipes pass through fire-rated walls, floors, ceilings, or other assemblies, the required firestopping materials shall be provided. Refer to Section 07 84 00—Firestopping for requirements.
 7. Nonshrink grout shall be as specified in Division 03.
 8. No chases or recesses shall be made in poured concrete for pipe installation, and no pipe shall run in poured concrete unless called for in the Drawings or specifications or permitted by ENGINEER. The cutting or core drilling of concrete for pipe shall be avoided wherever possible, and in no case where such cutting or core drilling is necessary shall reinforcing rods be cut or disturbed without notifying ENGINEER. All openings for pipe work shall be neatly patched in a workmanlike manner.
- C. Cleaning and Disinfection: All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the potable water system before it is put online. Water main shall be disinfected according to AWWA C651.

3.03 FIELD QUALITY CONTROL

- A. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price Bid.
- B. Work shall be tested as specified in this section. Unless indicated by ENGINEER in writing before testing begins, tests shall be witnessed by ENGINEER and others as necessary. Test

results shall be recorded, and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.

- C. New piping shall be tested. Piping, interior or exposed, shall be subject to test before being covered with insulation or paint or before caulking of any gaps at flanges of ductile iron piping. Piping and appurtenances shall be watertight or airtight and free from visible leaks.
- D. Piping shall be flushed or blown out after installation and prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.
- E. Gauges used for testing shall have increments as follows:
 - 1. Tests requiring a pressure of 10 psi or less shall use a testing gauge having increments of 0.10 psi or less.
 - 2. Tests requiring a pressure of greater than 10 psi but less than or equal to 100 psi shall use a testing gauge having increments of 1 psi or less.
 - 3. Tests requiring a pressure of greater than 100 psi shall use a testing gauge having increments of 2 psi or less.
- F. Pressure Tests: The test pressure in all lines shall be held for one hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests. All piping conveying a combination of fluids shall be tested at the higher test pressure.

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
PW	150	Water	"A"

Note: Leakage allowance Designation "A" shall mean zero leakage.

- G. See Section 22 13 16—Sanitary Waste and Vent Piping for testing of building drainage systems.
- H. Polyethylene encasement of cast iron drainage piping and appurtenances shall be in accordance with AWWA C105. Use Method A for pipe and Method C for valves. Repair any rips or punctures prior to backfilling pipe.

3.04 DEMOLITION

- A. All interior piping removals, including appurtenances and abandonment, shall be by CONTRACTOR. The locations and elevations of existing piping are approximate. Any change in pipe location or elevation shall be reviewed by ENGINEER.
- B. CONTRACTOR shall remove or abandon all existing piping and appurtenances as noted. Unless otherwise shown or specified, piping and appurtenances to be removed shall become the property of CONTRACTOR and shall be removed from the site for salvage or disposal.

- C. Valve boxes and exposed valves and operators on piping to be abandoned shall be removed. All concrete surfaces to remain shall be patched as required to provide a smooth surface. Repiping and connections to new piping shall be as specified for new piping.

3.05 DISINFECTION

- A. CONTRACTOR shall disinfect and flush the system before it is put on line.
- B. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria as part of the Lump Sum Bid. Copies of test results shall be submitted to OWNER and ENGINEER.
- C. Potable water piping shall be disinfected according to the *Standard Specifications for Water and Sewer Main Construction* in Illinois, which shall include initial flush and disinfection to 50 ppm with gaseous chlorine or other acceptable methods. Acceptable concentration after 24 hours shall be 25 ppm.

3.06 CLEANING

- A. All equipment and materials shall be clean before installation.
- B. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.
- C. All surplus material, tools, and equipment shall be removed, and the premises shall be left free of everything of the kind.

END OF SECTION

SECTION 40 05 53

IDENTIFICATION FOR PROCESS INTERCONNECTIONS PIPING AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: Perform all work required to furnish and install equipment, valve, pipe, and wire identification with supplementary items necessary for proper installation as specified herein, or shown on the Drawings. CONTRACTOR shall identify including, but not limited to, all equipment, valves, piping, ductwork, dampers, pumps, and wires.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.
- B. Schedule:
 - 1. Submit valve schedule complete with building number, room number, valve tag numbering system, valve function, valve type, area served, year installed, manufacturer, model number, size, rated pressure, temperature rating and normal position.
 - 2. Valve schedule shall be developed using OWNER's valve naming convention. Provide OWNER with electronic version (Microsoft Excel) of the final approved valve schedule at or before Project closeout.
 - 3. Submit equipment schedule complete with building number, room number, equipment tag numbering system, equipment function, equipment type, area served, year installed, manufacturer, model number, size, emergency power (Y or N) and rated capacity.

1.03 REFERENCES

- A. All material, installation, and workmanship shall comply with the applicable requirement and standards addressed within the following references: ASME A13.1–Scheme for the Identification of Piping Systems.

PART 2–PRODUCTS

2.01 NAMEPLATES

- A. Nameplate material shall be multi-color, 2-layer, nonconductive, engraving plastic suitable for permanent installations in indoor and outdoor locations. The material shall be UV-resistant and suitable for installation in direct sunlight.
- B. Type “A” Nameplates:
 - 1. Use: All equipment specified in Division 46.
 - 2. Size: 4-inch by 6-inch minimum.
 - 3. Background Color: Black.
 - 4. Character Color: White.

5. Character Size: 1 1/4 inches.
 6. Engraving: Equipment label.
 7. Mounting Location: As requested by ENGINEER. All fasteners shall be stainless steel.
- C. Type "B" Nameplates:
1. Use: Control panels.
 2. Size: As necessary.
 3. Background Color: Black.
 4. Character Color: White.
 5. Character Size: 3/16 inch.
 6. Engraving: Operating function.
 7. Mounting Location: As requested by ENGINEER.
- D. Type "C" Nameplates:
1. Use: Description of control panel function.
 2. Size: As necessary.
 3. Background Color: Black.
 4. Character Color: White.
 5. Character Size: 3/16 inch.
 6. Engraving: Operating function.
 7. Mounting Location: As requested by ENGINEER.
- E. Type "D" Nameplates:
1. Use: Operator instructions.
 2. Size: As necessary.
 3. Background Color: Yellow.
 4. Character Color: Black.
 5. Character Size: 3/16 inch.
 6. Engraving and Mounting Location: As requested by ENGINEER.
- F. Type "E" Nameplates:
1. Use: All equipment not specifically mentioned above.
 2. Size: As necessary.
 3. Material: 3-layer laminated Micarta.
 4. Background Color: Black.
 5. Character Color: White.
 6. Character Size: 3/16 inch.
 7. Engraving and Mounting Location: As requested by ENGINEER.

2.02 LABELING TAGS

- A. Labeling Tags:
1. Use: Field-mounted devices (Limit switches, etc.).
 2. Size: 1-inch by 3-inch.
 3. Material: 1/32-inch-thick stainless steel.
 4. Character Size: 1/4 inch.
 5. Engraving: As requested by ENGINEER.
- B. Valve Tags: All new valves shall be tagged. CONTRACTOR shall provide on valves, engraved 2 1/2-inch by 2 1/2-inch plastic laminated tags, Seton "Setonply Series M4550-H," or equal. Nomenclature for tagging (letters and numbers) will be provided by ENGINEER. Colors will be selected by OWNER. CONTRACTOR shall affix tags to valves with Brady 38091, or equal, stainless steel wire and Brady 38090, or equal, zinc wire clamps.

2.03 WIRE MARKERS

- A. Wire markers shall be permanently attached wraparound adhesive, sleeve- or heat-shrink-type labels. Wire numbering preprinted on the conductor, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable.
- B. Wire markers shall be specifically printed for this project using a wire marker printer. Handwritten markers are not acceptable.

2.04 PIPE MARKERS

- A. Manufacturers: Marking Services, Inc., Seton Name Plate Company, W.H. Brady Company, or equal.
- B. Pipe markers shall conform to ANSI A13.1. Arrow markers must have same ANSI background colors as their companion pipe markers or be incorporated into the pipe identification marker.
- C. Plastic Pipe Markers: Factory-fabricated, flexible, semirigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Pipe markers and arrow markers also shall be provided for all piping systems.
- E. Use Seton Setmark type SNA or Brady Snap-on type identification for all piping systems, up through 6 inches. For piping systems larger than 6 inches, use Seton or Brady strap-on markers, or similar, by Marking Services, Inc. Self-adhesive labels are not acceptable. Provide lettering in accordance with table below.

PIPE MARK SIZE CHART

Outside Pipe Diameter (Including Covering)	Minimum Length of Label Field Color (Inch)	Minimum Height of Letters (Inch)
3/4 inch to 1 1/4 inch	8	1/2
1 1/2 inch to 2 inch	8	3/4
2 1/2 inch to 6 inch	12	1 1/4
8 inch to 10 inch	24	2 1/2
Over 10 inch	32	3 1/2

PART 3-EXECUTION

3.01 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state, and local requirements and referenced standards and conform to code and ordinances of authorities having jurisdiction.
- B. Degrease and clean surfaces to receive nameplates.
- C. Install nameplates parallel to equipment lines.
- D. Affix nameplates with stainless steel screws or sticky-back adhesive.

- E. Affix labeling tags with permanent bonding cement or locking wire ties. Provide 3/8-inch hole to accommodate wire tie.
- F. Prepare and install neatly typed directions in all panels, including existing panels, where work is done under this Contract.
- G. Four-inch-round, 4-inch-square, and 4 11/16-inch junction boxes concealed above ceilings may be identified with neat lettering on the cover with a permanent-type black marking pen.

3.02 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, control panels, thermostats, junction boxes, and at load connection. Identify with branch circuit or feeder number for power circuits and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Wire markers shall be permanently attached wraparound adhesive or heat-shrink-type markers. Wire numbering preprinted on the conductor, individual wraparound numbers, and flag-type labels are not acceptable.
- B. Conductors in pull boxes, VFD enclosures, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system.

3.03 PIPE MARKERS

- A. Install pipe markers in accordance with manufacturer's instructions.
- B. Install in clear view and align with axis of piping.
- C. All pipes shall be labeled with a minimum of two labels in each room, crawl space, or compartment. Locate identification at maximum 20-foot centers on straight runs, including risers and drops adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction. Labels shall be abbreviated as noted under fluid abbreviations on Drawings.
- D. All piping containing or transporting hazardous or corrosive chemicals shall be identified with labels every 10 feet and with at least two labels in each room, closet, or pipe chase.
- E. Labels shall identify fluid being conveyed and include flow direction arrow. Provide a double-ended arrow marker when flow can be in either or both directions.
- F. CONTRACTOR shall include a schedule in its submittal identifying the various pipe designations, abbreviations, and labeling scheme. Colors, text, and piping abbreviations are to be selected by OWNER.

END OF SECTION

SECTION 41 22 23

HOISTS AND CRANES

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included:
 - 1. Hoists.
 - 2. Trolleys.
 - 3. Bridge Cranes.
 - 4. Conductor Systems.
 - 5. Flat Cable Festoon Systems.
 - 6. Cord Reels.
 - 7. Electrical System Controls.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. CMAA–Crane Manufacturers Association of America.
- B. MHI–Material Handling Institute, Inc.
- C. ANSI–American National Standard Institute.
- D. HMI–Hoist Manufacturers Institute.
- E. MMA–Monorail Manufacturers Association.

1.03 SYSTEM DESCRIPTION

- A. Crane System: Under-running crane systems shall include items specified in this section as appropriate, and all other specified accessories necessary to provide a complete functioning system.

1.04 DESIGN REQUIREMENTS

- A. Crane systems shall be designed and manufactured in accordance with CMAA Specification No. 74, *Specifications for Top Running and Under Running Single Girder Electric Overhead Traveling Cranes Utilizing Under Running Trolley Hoist*.
- B. Under running crane systems shall be designed and manufactured in accordance with ANSI MH 27.1, *Monorail Manufacturers Association Specifications for Underhung Cranes and Monorail Systems*. Where design standards of the CMAA and MMA conflict, the CMAA standards shall govern.
- C. Hoists shall be designed and manufactured in accordance with the standards of the Hoist Manufacturers Institute.

1.05 PERFORMANCE REQUIREMENTS

- A. Crane Systems: CONTRACTOR shall conduct start-up and testing of crane and monorail systems to demonstrate that load capacity and total system operation meet the requirements and intent of the Contract Documents.

1.06 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.
- B. Submit type, brand, and thickness of primer paint to be furnished on bridge cranes, runway beams, and monorails.
- C. Submittals shall include an equipment list, datasheet(s), system description, manufacturer's instructions, and electrical wiring diagrams for installation. Wiring diagrams shall be project-specific and comprehensive including device labels, point-to-point interconnections within control panels, and all interconnections between panels and remote devices. Drawings shall show all field wiring and communication interfaces along with project-specific wire/cable numbering that can be used by Division 26 for labeling field-installed wiring.

1.07 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 BRIDGE CRANE

- A. Bridge crane shall consist of a double girder under running bridge supported on four-wheel end trucks at each end. End trucks shall run on two runway beams located where shown on the Drawings. End trucks shall be manual.
- B. Bridge crane manufacturer shall design and provide runway beams and supporting column and frame system.
- C. Acceptable manufacturers include the following, or equal:
 - 1. UESCO Cranes, Inc., Worth, Illinois.

2. ACCO Chain and Lifting Products, York, Pennsylvania.
3. Lift Crane and Conveyor.

D. Crane schedule is as follows:

Building	Load Capacity	End Truck Motor Size	Motor Speeds
Eastern Receiving Station	2,000 lb.	Manual	---

E. Crane service classification shall be Class A–Standby Service, or better.

2.02 HOISTS

A. Hoists shall be Robbins & Myer (R & M) Spacemaster II, Yale Coffing, or equal, electric chain hoists. Motors shall be 460-volt, three-phase, 60 Hz. Provide chain container with hoists.

B. Hoist schedule is as follows:

Building	Model	Load Capacity	Motor Size	Speeds	Lift Height
Eastern Receiving Station	Coffing ECMT-1016	2000 lb.	1/2 hp	16 fpm	12 feet

2.03 TROLLEYS

A. Trolleys shall be Robbins & Myer (R & M), Yale Coffing, Columbus McKinnon, or equal.

B. Trolley schedule is as follows:

Building	Model	Load Capacity	Motor Size	Speeds	
Eastern Receiving Station	Coffing EC Plain	2,000 lb.	---	---	---

2.04 CONDUCTOR SYSTEM

A. Enclosed conduction electrical system shall be Insul-8-bar by Conductix-Wampler USA, or equal. System shall include conductor bars, clamps, brackets, and accessories. Complete system shall be stainless steel or galvanized steel.

B. Conductor system is required in the following locations:

Building	System	Location	Function
Eastern Receiving Station	Bridge Crane	On Runway Beam	Power to Bridge

2.05 FLAT CABLE FESTOON SYSTEM

A. Heavy-duty C-track flat-cable festoon system shall be provided at the following locations:

Building	System	Mounting Location	Function
Eastern Receiving Station	Bridge Crane	On Bridge Beam	Power to Bridge

- B. Tracks, support brackets, and accessories shall be stainless steel or aluminum.

2.06 ELECTRICAL SYSTEM CONTROLS

- A. Hoists, conductor systems, and flat cable festoon systems shall be rated NEMA 12.
- B. Hoists shall be controlled via a pushbutton pendant. Pushbutton pendant shall reach to within 3 feet 6 inches of the operating floor. Pushbutton pendant shall provide control of all system motions (up/down, etc.) and shall have an emergency stop pushbutton.
- C. Hoists shall have a control power transformer for dedicated control power circuit.
- D. Hoists motion shall be controlled by magnetic motor contactors mounted on shockproof mountings.
- E. Hoists shall accept a single point power connection.
- F. Local disconnect shall be provided by Division 26.

2.07 FINISHES

- A. Bridge crane runway beam and monorail beams shall be painted in accordance with Section 09 91 00—Painting requirements for steel, machinery, and equipment not submerged. Primer shall consist of one shop coat of Tnemec 69-1255 Hi-Build Epoxoline primer, 5.0 mils DFT. Load capacity shall be stenciled on the bridge and monorail beam after finish painting.
- B. Hoists and trolleys shall be factory-finished painted with the manufacturer's epoxy paint finish system.

PART 3—EXECUTION

3.01 EQUIPMENT INSTALLATION

- A. Install equipment as indicated and according to supplier's and manufacturer's instructions.
- B. CONTRACTOR shall inspect the units after delivery to the site for any damage to the units during shipping.

3.02 FIELD QUALITY CONTROL AND DEMONSTRATION

- A. Provide manufacturer's services for the following:
 - 1. Start-up.
 - 2. Field Testing: Equipment manufacturer shall provide a written report covering checkout, testing, inspections and start-up, and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.
 - 3. Operator training and final adjustment.

- B. Supervision and Start-Up: Installation of all equipment furnished under this Contract shall be supervised as required by a qualified representative of equipment manufacturer. All equipment shall be placed in operation, and the plant operator shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentation given by manufacturer's representatives.

3.03 FINISHING

- A. CONTRACTOR shall provide finish paint as required by Section 09 91 00–Painting.

3.04 ADJUSTING, CLEANING, AND PROTECTION

- A. CONTRACTOR shall provide final adjusting, cleaning, and protection in accordance with Division 01. CONTRACTOR shall make all final adjusting on equipment as required by manufacturer. CONTRACTOR shall leave equipment in a clean condition.

3.05 LUBRICATION

- A. CONTRACTOR shall furnish a one-year supply of grease and oils for all items of equipment requiring lubrication. Lubricants for all items of equipment shall be the same brand, when available, as recommended by the manufacturer to meet both warm and cold weather requirements.

END OF SECTION

SECTION 43 23 21.13

CENTRIFUGAL PUMPS

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: This section includes furnishing, installing, and placing into successful operation two Low Zone and three High Zone vertical centrifugal booster pumping units as indicated on the Drawings. The pumps and appurtenances shall be furnished by the same supplier.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.
- C. Pump Spare Parts Allowance: An allowance shall be included in the Lump Sum Bid of \$1,000 for manufacturer-recommended pump spare parts. CONTRACTOR shall purchase and provide to OWNER. Contract amount will be adjusted (Add or Deduct by change order) based on the actual cost of the pump spare parts recommended by the pump manufacturer.

1.02 REFERENCES

- A. AIEE—American Institute of Electrical Engineers Standard.
- B. ANSI—American Nation Standards Institute Standard.
- C. AWWA E103—Horizontal and Vertical Line-Shaft Pumps.
- D. HI—Hydraulic Institute Standard.
- E. IEEE—Institute of Electrical and Electronics Engineers Standard.
- F. NEC—National Electrical Code.
- G. NEMA MG1, Part 31—National Electrical Manufacturers Association Standards Publication Motors and Generators, Definite-Purpose Inverter-Fed Polyphase Motors.
- H. NEMA—National Electrical Manufacturers Association Standard.
- I. NSF 372—Drinking Water System Components-Lead Content.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. CONTRACTOR shall furnish detailed drawings and description showing the size, dimensions of pumps, dimensions of motors, dimensions of bases, and necessary foundation drawings, giving exact position of all bolts.
 - 2. All information required in this paragraph is to be submitted in duplicate.
 - 3. Certified pump dimensional drawings shall be submitted to ENGINEER within 30 days after award of Contract.

4. The drawings will be used by CONTRACTOR to order piping and construct pump bases.
5. Submittals for motors shall include data sheets from the motor manufacturer. Data sheets from the pump manufacturer or supplier are not acceptable.
6. Additional shop drawing requirements are discussed in Division 01.

B. Factory Test and Acceptance:

1. All equipment shall be factory tested in accordance with AWWA E103 standard running test and discharge head hydrostatic test requirements plus the requirements of these specifications. Test shall be made with field motor.
2. Test points shall include shutoff head performance point, cutoff head, plus at least three other points as required for accurate curve plotting. Head shall not include velocity head. Three certified copies of test data, notation of presence or absence of cavitation, computations for performance curve construction, computations for kWh per 1,000 gallons power consumption, field head-discharge curves, field wire-to-water efficiency curves, and field-motor load, all from shutoff to cutoff head, shall be submitted to ENGINEER for approval. Total head shall be as defined herein.
3. The pump shall meet the requirements of 2011 Hydraulic Institute Standards Acceptance Grade 1U. Acceptance Grade 1U has the following tolerances:

Test Parameter	Guarantee Requirement	Tolerance Band (1U)
Rate of Flow	Mandatory	0% to +10%
Total Head	Mandatory	0% to +6%

4. Acceptable is achieved when either test flow or head (or both) are within the defined tolerance band.
5. Shipment shall not be made until ENGINEER determines that the factory test results are acceptable.

1.04 QUALITY ASSURANCE

- A. Equipment shall conform to the standards of the AIEE, ANSI, HI, NEC, NSF, and NEMA, and to the state regulatory requirements. Except as otherwise specified, the units shall conform to AWWA E103.
- B. Certification: Provide manufacturer's affidavit of compliance per AWWA E103.

1.05 WARRANTY

- A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.06 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the

product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.

- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved “or-equal” in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved “or-equal” request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MANUFACTURER

- A. Type of pump, efficiency, and head discharge curve shall be similar to Aurora Model 411, or equal.

Pump	Aurora Model
BP-15-01	Series 413 5x6x17
BP-15-02	Series 413 5x6x17
BP-15-03	Series 413 4x5x15
BP-15-04	Series 413 4x5x15
BP-15-05	Series 413 4x5x15

- B. The Drawings and Specifications were prepared based on Aurora. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes, including engineering changes, to accommodate the other Base Bid equipment including, but not limited to, structural, mechanical, and electrical work.

2.02 EQUIPMENT

- A. Design Requirements:
- Pumps shall be vertical centrifugal single-stage double-suction, nominal 1,200 rpm.
 - Low Zone Booster Pumps (BP-15-01 and BP-15-02) shall be on VFDs and shall have the following performance capacity:

Manufacturer	Model	Typical Flow (gpm)	Typical Head (ft)	Operational Flow Range (gpm)	Operational Head Range (ft)
Peerless	4AE-11-Vert	975	110	500 to 975	95-130
Aurora	Series 413 5x6x17	975	110	500 to 975	95-130

- High Zone Booster Pumps (BP-15-03, BP-15-04, and BP-15-05) shall be on VFDs and shall have the following performance capacity:

Manufacturer	Model	Typical Flow (gpm)	Typical Head (ft)	Operational Flow Range (gpm)	Operational Head Range (ft)
Peerless	5AE-14-Vert	950	155	500 to 950	140-170
Aurora	Series 413 4x5x15	950	185	500 to 950	140-170

4. A steep head discharge curve, maintaining high efficiency to each side of the performance point is desired, and these characteristics will be considered in awarding the Contract.
5. Total head as specified is the sum of suction and discharge pressure heads measured through piezometer connections on the horizontal centerline of the suction and discharge nozzles with no credit for difference in velocity heads at these points.
6. The pump design shall be such that the units operate satisfactorily without cavitation, excessive noise, or vibration in excess of limits set forth in the Hydraulic Institute Standards on the pumping units installed as shown on the Drawings and operating within the range of heads and suction conditions specified.
7. To convert shop test motor loads to field heads and field driver loads, hydraulic and mechanical friction loads as shown in AWWA E103 shall be used.

2.03 COMPONENTS

A. Casings:

1. The casings shall be cast iron, horizontally split with ASA 125 psi flanged suction and discharge connections in lower half of casing.
2. The pump may be started and stopped against a closed valve in the discharge piping, and pump construction shall be proper for pressures developed under this condition.
3. Provide 1/4-inch tapped piezometer connections on horizontal centerline of suction and discharge nozzles, and 1-inch tapped priming connection at high point of casing.

B. Impellers:

1. Impellers shall be cast bronze or other material as recommended by manufacturer for the water being pumped, double-suction type, mechanically and hydraulically balanced.
2. Provide renewable stainless steel wearing rings on impellers, and stainless steel rings on casings.
3. Impellers shall be compatible with chlorinated water and meet NSF 372 requirements.

C. Shaft: Shafts shall be equipped with renewable stainless steel sleeves. External piping complete with snubber valves shall be installed from the casing to each sealing box to circulate water to the seals.

D. Bearings and Couplings:

1. Bearings shall be cartridge-type ball bearings, grease-lubricated, designed to resist radial and thrust loads.
2. Grease seals and water slingers shall be provided for protection of the bearings.
3. Bearings to provide average AFBMA B-10 rated life of 50,000 hours or more at duty point.
4. Shaft deflection shall not exceed .003 inch at greatest loads to prolong mechanical and bearing life.

5. Each pump is to be furnished with mechanical seal boxes, placed on both sides of the pump centerline to seal pump shaft. Seals shall have all metal parts, 303 stainless steel with Buna-N elastomers, Ni-Resist seal and carbon washers.
6. A bypass line shall be provided for the upper seal between the seal faces and the discharge flange to provide adequate venting of the seal chamber and to provide lubrication.
7. The mechanical seal boxes shall be equipped with heavy cast one-piece O-ring sealed glands made from bronze or cast iron.
8. A flexible coupling, Wood, Dodge, or equal shall be provided. A base-mounted coupling guard shall be provided.

E. Base:

1. A one-piece cast iron or fabricated steel base shall be provided upon which both the pump and motor are mounted.
2. The base shall have a raised edge or trough for collecting drainage, and this trough shall be provided with 1-inch-diameter tapped outlets for pumps with packing glands.
3. Anchor bolts and foundation drawings are to be provided.
4. The space under the base will be filled with grout, and proper and separate openings shall be provided for placing grout and venting air. Vents shall be at each corner of the base.

2.04 MOTORS

- A. Motors shall conform to all applicable requirements of NEMA, ANSI, IEEE, and NEC standards and shall be UL-recognized.
- B. Motors provided shall meet the following requirements. Motors shall not be loaded beyond nominal rating, not including service factor, at any design condition:
 1. Physical Construction:
 - a. Copper leads and windings. Motor leads shall have the same insulation class as the windings.
 - b. Rotor bars shall be aluminum.
 - c. Motors shall be equipped with grease fittings and automatic grease reliefs. Bearings shall be prelubricated and field regreasable. Openings for addition of grease shall have grease fittings provided.
 2. Mounting: As recommended by the manufacturer.
 3. Enclosure: TEFC.
 4. Efficiency: Premium efficiency as noted in schedule below.
 5. Service Factor: 1.0 on VFD power, 1.15 on sine wave power.
 6. Power requirements: 60 Hz, three-phase, 230/460-volt, factory-wired for 460-volt connection, $\pm 10\%$ voltage variation.
 7. Load type: Variable torque.
 8. NEMA Design: B.
 9. Insulation: Class F and rated for a Class B temperature rise.
 10. Nominal operating speed: Refer to the motor schedule below.
 11. Nameplate: Stainless steel engraved attached to motor frame or enclosure with stainless steel rivets.
 12. Conduit/Junction Box: Cast iron, diagonally split, fully rotatable, gasketed between cover and box, and between box and frame. Motor lead opening in the frame shall also be gasketed. A clamp-type terminal shall be provided inside each motor conduit box for grounding.

13. Accessories:
 - a. Oversized motor junction box.
 - b. Lifting eyes.
 - c. Thermostats applied to motor windings, capable of shut down and manual reset by external controls (by Division 26).
 14. VFD requirements: Motor operating on VFDs shall be inverter duty rated, meet the requirements of NEMA MG1, Part 31, and be capable of a minimum speed turndown of 10:1. Motors shall also include shaft grounding rings as manufactured by AEGIS, or equal.
- C. Motor Schedule: If motor horsepower is increased to meet the requirements of this specification, CONTRACTOR is responsible for increasing all wiring, starters, drives, and other electrical components as required by Code, at no additional cost to OWNER.

Pump	Horsepower	Nominal Speed	Efficiency	VFD
BP-15-01	50	1,200	94.5%	Yes
BP-15-02	50	1,200	94.5%	Yes
BP-15-03	75	1,200	95.4%	Yes
BP-15-04	75	1,200	95.4%	Yes
BP-15-05	75	1,200	95.4%	Yes

2.05 VARIABLE SPEED PUMP CONTROLS

- A. Variable speed drives are specified in Division 26 of these specifications. Care shall be taken in sizing the drive to provide adequate starting torque for the pumps. This information shall include, but not be limited to, motor full load amps and locked rotor amps, and shall be provided to the variable speed supplier specified in Division 26.
- B. Pump controls are specified in Division 26, Section 26 09 00—Controls and Instrumentation of these specifications. Pump manufacturer shall review these controls and coordinate with Division 26.

2.06 FINISHES

- A. It is the intent of these specifications that equipment, support, and accessories be furnished factory shop-primed and factory-finished painted. Equipment and appurtenances shall be prepared in accordance with commercial grade SSPC specifications No. 6. Priming and finish painting shall be as recommended by manufacturer. Touchup paint shall be provided by manufacturer.

2.07 ANCHOR BOLTS

- A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 05.

2.08 SPARE PARTS

- A. Provide manufacturer-recommended spare parts and tools for all pumps.

PART 3-EXECUTION

3.01 GENERAL

- A. Refer to requirements specified in Division 01 for equipment installation, quality control, testing, supervision, start-up, and operator training.

3.02 VARIABLE SPEED CONTROL COORDINATION

- A. The equipment manufacturer shall coordinate with the variable speed drive supplier at the time of equipment startup to address minimum speed requirements to protect both motor and equipment and to meet specified design and performance requirements. Minimum speed settings (in hertz) shall be provided to OWNER. Equipment operation over the entire control range shall be completed to demonstrate successful operation and to meet specified design and performance requirements.

3.03 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. OWNER will make field tests to check compliance with these specifications. Site tests may include test of pump operation to confirm operation in accordance to the factory characteristic curve, operation within the specified Acceptance Bands, vibration tolerances, and other tests deemed necessary by OWNER.
 - 2. If the unit, after installation, does not operate smoothly, does not meet the vibration limitations, does not operate in accordance with the factory characteristics curve, or does not operate within the specified Acceptance Bands, or otherwise not meet the requirements of these specifications; OWNER retains the right to reject the equipment and not pay for the equipment. CONTRACTOR may, with OWNER's permission, conduct field tests and make field corrections; and/or remove the equipment, shop test and make shop corrections to meet these requirements. Payment will not be made until these requirements are met.
 - 3. Vibration at any point on the equipment and shafting as operated in the field in excess of limits set forth in the current edition of the Hydraulic Institute Standards shall be the cause for rejection. All surfaces intended for bearing shall be in full contact, and insertion of washers or spacers to minimize vibration will not be permitted.

END OF SECTION

SECTION 43 32 76

CHLORINATION EQUIPMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work Included: This section includes furnishing, installing, and placing into successful operation chlorination systems as shown on the Drawings and specified herein. The equipment and appurtenances shall be furnished by the same supplier.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. NEMA—National Electrical Manufacturers Association Standard.

1.03 SUBMITTALS

- A. Shop drawings showing system installation shall be submitted.
- B. Schematic diagram for installation must be reviewed by ENGINEER before approval of equipment will be made.

1.04 WARRANTY

- A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.05 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00—Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MANUFACTURERS

- A. Feed pumps for the Eastern and Western Receiving Stations shall be Watson-Marlow Fluid Technology Solutions (WMFTS).

2.02 EQUIPMENT

- A. Peristaltic Chlorine Metering Pump:
 - 1. Provide three WMFTS Qdos CWT Universal+ chemical feed pumps for the Eastern Receiving Station.
 - 2. Provide one WMFTS Qdos CWT Universal+ chemical feed pump for the Western Receiving Station.
 - 3. Desired chlorine concentration to be 1.5 ppm in treated water. Output shall be adjustable while pumps are in operation from zero up to a maximum usable capacity of 4.14 gph at the Eastern Receiving Station and 0.52 gph at the Western Receiving Station.
 - 4. Pumps shall consist of an enclosed housing with bolted clear cover and roller compressor mechanism designed for operation with a hose. Hose shall be rigidly mounted to the pump body with NPT connections. Provide 12 inches of PE piping to connect to the two NPT connections before hard piping begins for easy removal of hose.
 - 5. Housing: Cast aluminum with a corrosion-resistant ECTFE Halar fluoropolymer powder coating.
 - 6. Rotor: Corrosion-resistant ECTFE Halar fluoropolymer powder-coated carbon steel with selectable shaft position for hose.
 - 7. Shafts: Corrosion-resistant 316 stainless steel.
 - 8. Rollers: Three reinforced Delrin rollers located 120 degrees apart for compression of the hose against the housing. One roller shall at all times be fully engaged with tubing providing complete compression to prevent backflow or siphoning.
 - 9. Cover: Removable one-piece clear polycarbonate viewing cover.
 - 10. Connections: Rigid inlet and outlet connections shall be MNPT with 316 SS, or as required for service. MNPT port connection size shall be 3/8 inch.
 - 11. Gearbox: Gearbox shall be of the in-line helical-footed design and an AGMA Class II continuous-duty rating, NEMA 56C input.
 - 12. Hose: Rubber hose shall be designed specifically for use with peristaltic pumps, working pressures to 115 psi. They shall be constructed from the highest quality compounded rubber materials, reinforced with multiple layers of braided nylon, and have a durometer rating of 55 to 70 Shore A. Wetter layer shall be EPDM, or as required for service. Hose lubrication will be with a food-grade silicon grease.
 - 13. Motor shall be 125 rpm, TENV, inverter duty meeting NEMA MG1 Parts 30 and 31, and be capable of minimum speed turndown of 3333:1. Motor shall have stainless steel shaft, steel bearings, and be rated for installation in a NEMA 4X area. Motor shall be rated for 60 Hz, single-phase, 120-volt power, $\pm 10\%$ voltage variation, and include 6-foot power cord and NEMA 5-15P plug.
 - 14. Controls:
 - a. Local keypad controls shall include: Start, Stop, and Speed Control.
 - b. Remote Controls shall include: Running, Fail, Fluid Recovery, Leak Detection, Restart, Start/Stop, and Speed Control.
 - 15. Provide a pressure relief valve for each chlorine pump.

16. Performance: Pumps shall be capable of self-priming when completely dry with a suction lift capability of 25 feet. Pump shall be capable of running dry without damaging effects to the pump or tube.
17. Spare Parts: Provide five replacement hoses.

2.03 ACCESSORIES

- A. Provide one 750-gallon polyethylene double-walled bulk tank with graduations on the side for the Eastern Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- B. Provide one 120-gallon, polyethylene, double-walled bulk tank with graduations on the side for the Western Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- C. Provide three 35-gallon polyethylene day tanks for the Eastern Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- D. Provide one 35-gallon polyethylene day tank for the Western Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- E. Provide necessary tubing, hose pipe, couplings, fittings, and valves for complete installation.
- F. Provide three Ultratech Ultra-Spill Pallet P1 Plus with drain, or equal, for the day tanks at the Eastern Receiving Station.
- G. Provide one Ultratech Ultra-Spill Pallet P1 Plus with drain, or equal, for the day tank at the Western receiving station.
- H. Include a 3/4-inch corporation cock with NPT threads, check valve, and solution tube for point of application.
- I. Provide injection nozzle equal to LMI Model 49287. Include 3/4-inch NPT injection check valve with corporation stop and nozzle assembly.
- J. Chlorine Analyzer (AIT-15-01, AIT-15-02, AIT-15-03, AIT-15-05, and AIT-20-01):
 1. Provide four chlorine analyzer systems consisting of analyzer and transmitter as shown on the Drawings.
 2. Chlorine analyzer shall employ a DPD colorimetric method of measurement using DPD indicator and a buffer solution.
 3. Analyzer shall be capable of measuring free or total residual chlorine by changing the indicator and buffer solutions.
 4. A measurement shall be taken every 2.5 minutes and results displayed on the associated transmitter in the range of 0 to 10 mg/L.
 5. Analyzer shall be designed for 30 days unattended operation and use only 0.5 L of each reagent per month. An additional month's supply of free chlorine reagents shall be provided.
 6. Provide a sampling conditioning kit. Provide pressure reducing valve as required to meet manufacturer's maximum pressure requirements.
 7. Analyzer shall operate with an LED light source with a peak wavelength of 510 nm.

8. The instrument shall measure a sample blank before each sample measurement to provide automatic zero reference to compensate for sample color and turbidity and changes in light intensity resulting from voltage fluctuations or light source aging.
9. The instrument shall provide a minimum detection limit of 0.035 mg/L or better, precision better than $\pm 5\%$ or 0.005 mg/L as Cl^2 , and accuracy better than $\pm 5\%$ or 0.035 mg/L as Cl^2 .
10. Analyzer shall be wired to a transmitter via manufacturer-furnished cable. Transmitter shall be microprocessor-controlled and provide a 4-20 mA output, as well as two alarm relay outputs. Two SPDT configurable alarm output relays with contacts rated at 5 A resistive load at 230 VAC shall be provided.
11. Each alarm output on the transmitter shall be user-selectable for sample concentration alarms (high or low), analyzer system warnings, or analyzer system shutdown alarms.
12. Sample concentration alarms shall be fully adjustable through the entire range.
13. System warning shall activate for minor variations in analyzer performance.
14. A system alarm shall activate for major variations in analyzer performance and it shall shut down the analyzer until corrective action is taken.
15. The transmitter's microprocessor shall provide self-diagnostic functions accessible through an alphanumeric, menu-driven keyboard.
16. Recorder span minimum and maximum values shall be operator programmable at the menu-driven keypad over the entire operating range.
17. Chlorine analyzer and transmitter shall be housed in a NEMA 4X-rated, ABS plastic enclosure designed for wall mounting.
18. Enclosure shall have two clear polycarbonate windows for viewing reagent levels.
19. Transmitter power requirements shall be 115 VAC, 50/60 Hz, 95 VA maximum.
20. System shall be a Model CL17 sc chlorine analyzer with sc200 transmitter as manufactured by Hach Company.

2.04 CHLORINE TRANSFER PUMP

- A. Chlorine transfer pumps for transferring chlorine between bulk tank and day tanks shall be March Pump BC-4K-MD, or equal.

2.05 FINISHES

- A. Provide factory-applied paint finish to all fabricated items; color to be selected by ENGINEER.
- B. Piping, insulation, valves, fittings, and other items which are not provided with a factory finish shall be coated per Division 09.

PART 3-EXECUTION

3.01 INSTALLATION

- A. Provide all necessary tubing, hose, couplings, fittings, and valves for a complete installation. Point of application for chlorine shall be as shown on the Drawings.

3.02 TESTING AND START-UP

- A. Provide manufacturer's services for the following:
 - 1. Start-up for each item of equipment.
 - 2. Field testing for each item of equipment.

END OF SECTION

SECTION 46 33 10

CORROSION INHIBITION EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

- A. Work Included: This section includes furnishing, installing, and placing into successful operation complete corrosion inhibition systems as shown on the Drawings and specified herein. The equipment and appurtenances shall be furnished by the same supplier.
- B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

- A. NEMA–National Electrical Manufacturers Association Standard.

1.03 WARRANTY

- A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

1.04 BUILD AMERICA, BUY AMERICA REQUIREMENTS

- A. CONTRACTOR shall comply with the Build America, Buy America (BABA) requirements of Title IX of the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58). CONTRACTOR shall submit with each shop drawing, certification that regulated iron, steel, manufactured products, and construction materials meet BABA requirements; or submit with each shop drawings a letter stating that BABA regulated product and the product's value to be included in the BABA de minimis log. Refer to Section 01 41 00–Regulatory Requirements for BABA requirements.
- B. The named item of equipment or material in the specifications establishes the type, function, appearance, and quality required, but may not meet the requirements of BABA. CONTRACTOR shall meet BABA requirements for the named item of equipment or material, an approved "or-equal" in accordance with GC-7.05; or include on the BABA national de minimis waiver if the waiver conditions are met. An approved "or-equal" request to meet BABA requirements shall not result in any change in Contract Price or Contract Times.

PART 2–PRODUCTS

2.01 MANUFACTURERS

- A. Feed pumps for the Eastern and Western Receiving Stations shall be Watson-Marlow Fluid Technology Solutions (WMFTS) Qdos CWT Universal+.

2.02 EQUIPMENT

A. Peristaltic Orthophosphate Metering Pump:

1. Provide one WMFTS Qdos CWT Universal+ chemical feed pump for the Eastern Receiving Station.
2. Provide one WMFTS Qdos CWT Universal+ chemical feed pump for the Western Receiving Station.
3. Desired orthophosphate concentration to be 2.0 ppm in treated water. Output shall be adjustable while pumps are in operation from zero up to a maximum usable capacity of 0.68 gph at the Eastern Receiving Station and 0.09 gph at the Western Receiving Station.
4. Pumps shall consist of an enclosed housing with bolted clear cover and roller compressor mechanism designed for operation with a hose. Hose shall be rigidly mounted to the pump body with NPT connections. Provide 12 inches of PE piping to connect to the two NPT connections before hard piping begins for easy removal of hose.
5. Housing: Cast aluminum with a corrosion-resistant ECTFE Halar fluoropolymer powder coating.
6. Rotor: Corrosion-resistant ECTFE Halar fluoropolymer powder-coated carbon steel with selectable shaft position for hose.
7. Shafts: Corrosion-resistant 316 stainless steel.
8. Rollers: Three reinforced Delrin rollers located 120 degrees apart for compression of the hose against the housing. One roller shall at all times be fully engaged with tubing providing complete compression to prevent backflow or siphoning.
9. Cover: Removable one-piece clear polycarbonate viewing cover.
10. Connections: Rigid inlet and outlet connections shall be MNPT with 316 SS, or as required for service. MNPT port connection size shall be 3/8 inch.
11. Gearbox: Gearbox shall be of the in-line helical-footed design and an AGMA Class II continuous-duty rating, NEMA 56C input.
12. Hose: Rubber hose shall be designed specifically for use with peristaltic pumps, working pressures to 115 psi. They shall be constructed from the highest quality compounded rubber materials, reinforced with multiple layers of braided nylon, and have a durometer rating of 55 to 70 Shore A. Wetter layer shall be EPDM, or as required for service. Hose lubrication will be with a food-grade silicon grease.
13. Motor shall be 125 rpm, TENV, inverter duty meeting NEMA MG1 Parts 30 and 31, and be capable of minimum speed turndown of 3333:1. Motor shall have stainless steel shaft, steel bearings, and be rated for installation in a NEMA 4X area. Motor shall be rated for 60 Hz, single-phase, 120-volt power, $\pm 10\%$ voltage variation, and include 6-foot power cord and NEMA 5-15P plug.
14. Controls:
 - a. Local keypad controls shall include: Start, Stop, and Speed Control.
 - b. Remote Controls shall include: Running, Fail, Fluid Recovery, Leak Detection, Restart, Start/Stop, and Speed Control.
15. Provide a pressure relief valve for each orthophosphate pump.
16. Performance: Pumps shall be capable of self-priming when completely dry with a suction lift capability of 25 feet. Pump shall be capable of running dry without damaging effects to the pump or tube.
17. Spare Parts: Provide two replacement hoses.

2.03 ACCESSORIES

- A. Provide one 360-gallon, polyethylene, double-walled bulk tank with graduations on the side for the Eastern receiving station. Tank material and all wetted parts shall be chemically compatible.
- B. Provide one 60-gallon, polyethylene, double-walled bulk tank with graduations on the side for the Western Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- C. Provide one 35-gallon, polyethylene, double-walled day tank with graduations on the side for the Eastern Receiving Station. Tank material and all wetted parts shall be chemically compatible.
- D. Include 3/4-inch corporation cock with NPT thread, ball valve, check valve, and solution tube for point of application.
- E. Provide injection nozzle equal to LMI Model 49287. Include 3/4-inch NPT injection check valve with corporation stop and nozzle assembly.
- F. Provide one Ultratech Ultra-Spill Pallet P1 Plus with drain, or equal, for the day tank at the Eastern Receiving Station.
- G. Provide one Ultratech Ultra-Spill Pallet P1 Plus with drain, or equal, for the tank at the Western Station.
- H. Orthophosphate Analyzer (AIT-15-04):
 - 1. Provide one phosphate analyzer system consisting of analyzer as shown on the Drawings.
 - 2. The phosphate analyzer shall be a semi-continuous reading instrument, using the ascorbic acid colorimetric method of analysis
 - 3. Analyzer shall be capable of a continual measurement every 9 minutes, or a user-selectable interval between measurements of 4.5 to 240 minutes.
 - 4. The instrument shall provide a detection range of 0.04 mg/L to 3 mg/L
 - 5. Display screen shall be a color LCD screen.
 - 6. Display screen shall be capable of graphing all available parameters on a scalable time.
 - 7. Analyzer shall be capable of grab sample IN (from external source to the analyzer) and grab sample OUT (from the analyzer to external source) to save time, without interrupting continuous sample flow to the analyzer.
 - 8. Analyzer must operate using 110 to 240 VAC, 50/60 Hz power.
 - 9. Analyzer must be able to conduct 1-point automatic calibration using installed standards.
 - 10. Four SPDT relays (Form C) shall be provided, rated for 5 amps at 240 VAC resistive maximum.
 - 11. Four analog 0/4-20 mA outputs shall be provided with a maximum impedance of 500 ohms.
 - 12. System shall be a Model 5500sc LR Phosphate analyzer as manufactured by Hach Company.

2.04 ORTHOPHOSPHATE TRANSFER PUMP

- A. Orthophosphate transfer pumps for transferring chlorine between bulk tank and day tanks shall be March Pump BC-4K-MD, or equal. Pumps shall be 120-volt, single-phase.

2.05 FINISHES

- A. Factory-fabricated items shall have a factory-applied finished paint system.
- B. Other items shall be painted per Division 09.

PART 3-EXECUTION

3.01 INSTALLATION

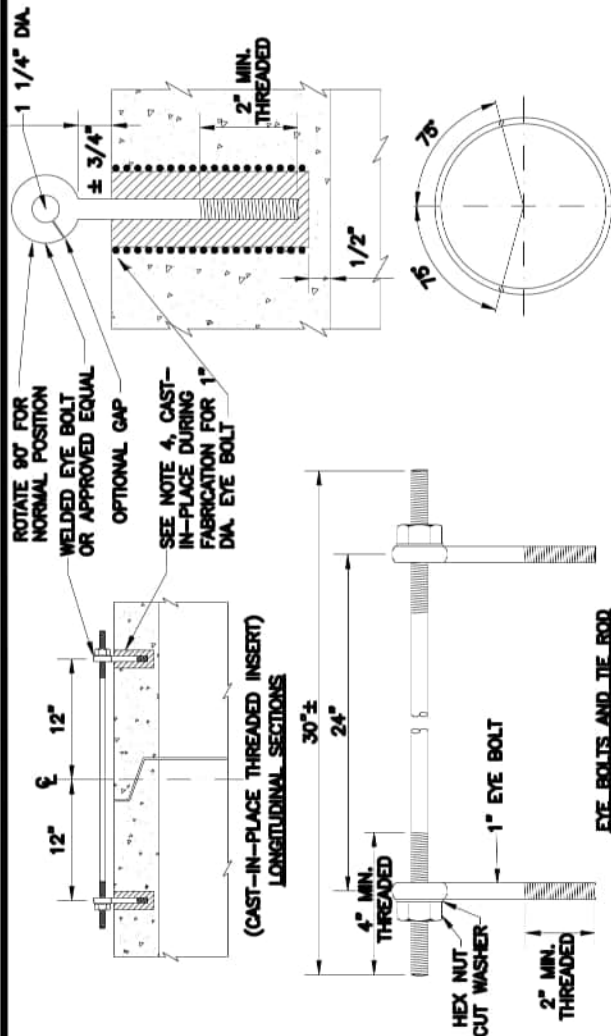
- A. Provide all necessary tubing, hose, pipe, couplings, fittings, and valves for a complete installation. Point of application for chemical shall be as shown on the Drawings.

3.02 TESTING AND START-UP

- A. Provide manufacturer's services for start-up and field testing of all equipment.

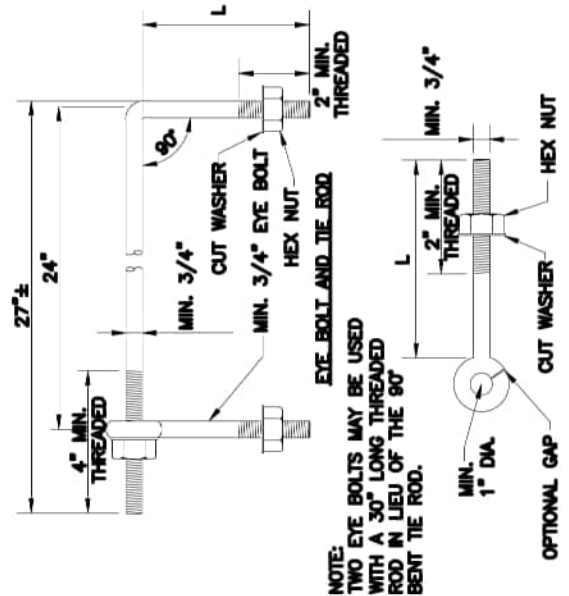
END OF SECTION

DRAWINGS

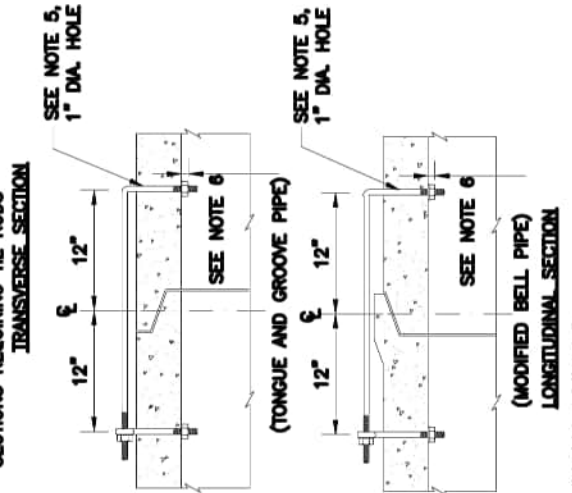


1. EYE BOLTS AND TIE ROD

2. EYE BOLT AND TIE ROD ASSEMBLY, TYPE 1



3. PLACEMENT OF (2) CAST-IN-PLACE INSERTS OR HOLES DURING FABRICATION FOR PIPE SECTIONS REQUIRING TIE RODS



PIPE DIAMETER	TIE ROD DIAMETER	D	L1	N
12-60	5/8	5/8	5	1/2
66-84	3/4	3/4	5	1/2
90-108	1	1	7	7/16

DIMENSIONS SHOWN ARE IN INCHES

PIPE SIZE	TONGUE & GROOVE PIPE	MODIFIED BELL PIPE
18" TO 24"	4 1/2"	6 1/4"
30"	5"	7"
36"	5 1/2"	7"
42"	6"	7"
48"	6 1/2"	7"
60"	7 1/2"	7"
66"	8"	7"

NOTES:

1. ALL APRON END WALL JOINTS AND TWO ADDITIONAL UPSTREAM JOINTS (TOTAL OF 3) SHALL BE TIED TOGETHER AS SHOWN. ADDITIONAL TIED JOINTS MAY BE REQUIRED, AS SPECIFIED OR AS SHOWN ON THE PLAN. UNLESS OTHERWISE STATED IN THE CONTRACT THE MATERIALS, FABRICATION AND WORK NECESSARY TO TIE CULVERT PIPE AS INDICATED ON THE PLANS AND BY THIS DETAIL WILL BE CONSIDERED INCIDENTAL TO THE REINFORCED CONCRETE CULVERT PIPE.
2. DETAILED DRAWINGS FOR PROPOSED ALTERNATE DESIGNS FOR JOINT TIES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
3. 1/2" OF TONGUE AND GROOVE OR BELL AND SPIGOT JOINTS.
4. THE INSIDE OF THE THREADED INSERTS SHALL BE CLEAN TO ALLOW THE INSERTION OF THREADED EYE BOLTS.
5. HOLES SHALL BE CAST-IN-PLACE OR DRILLED 12" FROM 1/2" OF TONGUE AND GROOVE.
6. BOLT PROJECTION INSIDE OF PIPE SHALL NOT EXCEED 2".
7. ROD DIAMETER +1".
8. LENGTH ADEQUATE TO EXTEND TO WITHIN 1/2" INCH OF THE INNER SURFACE OF THE PIPE.

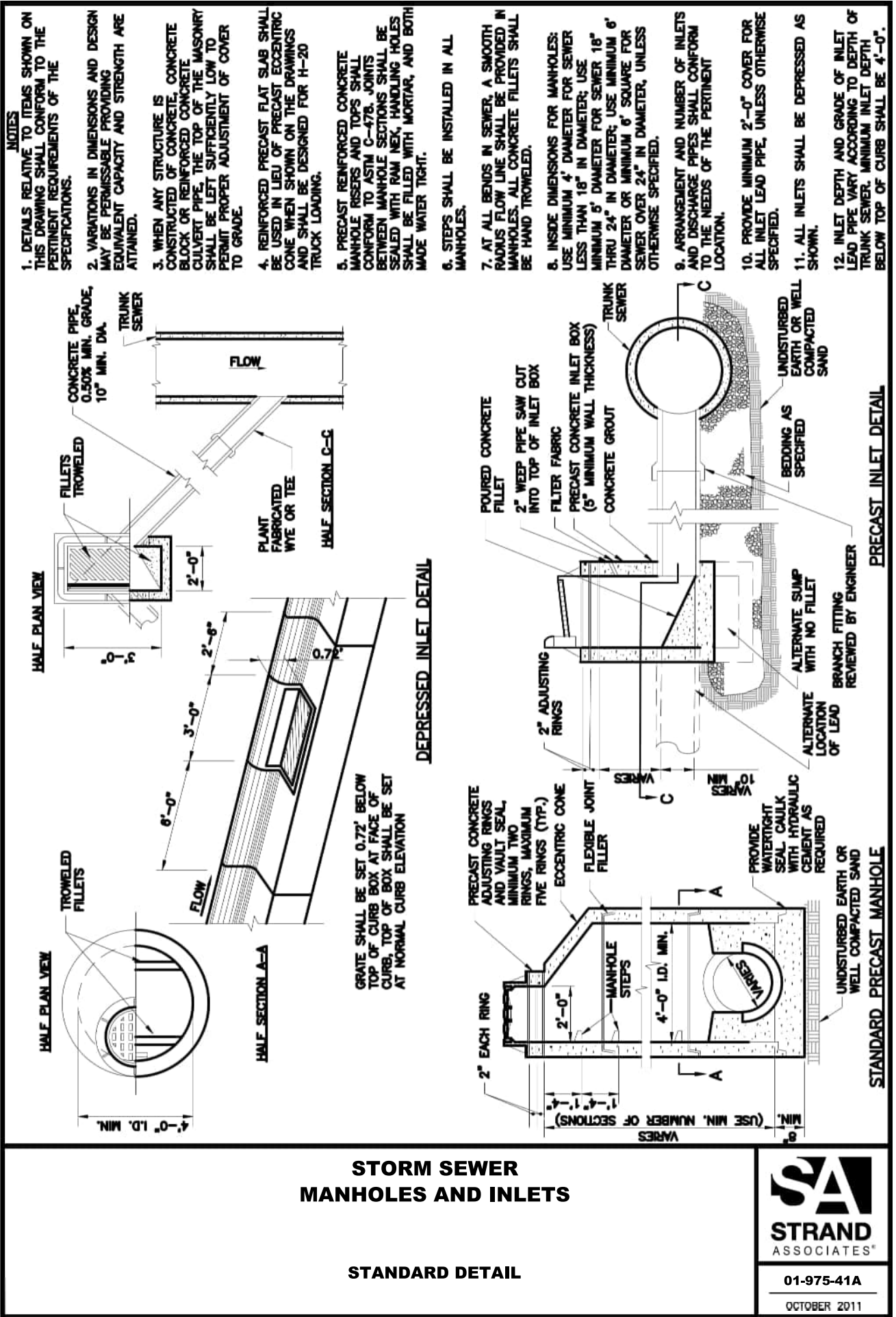
JOINT TIES FOR CONCRETE PIPE

STANDARD DETAIL

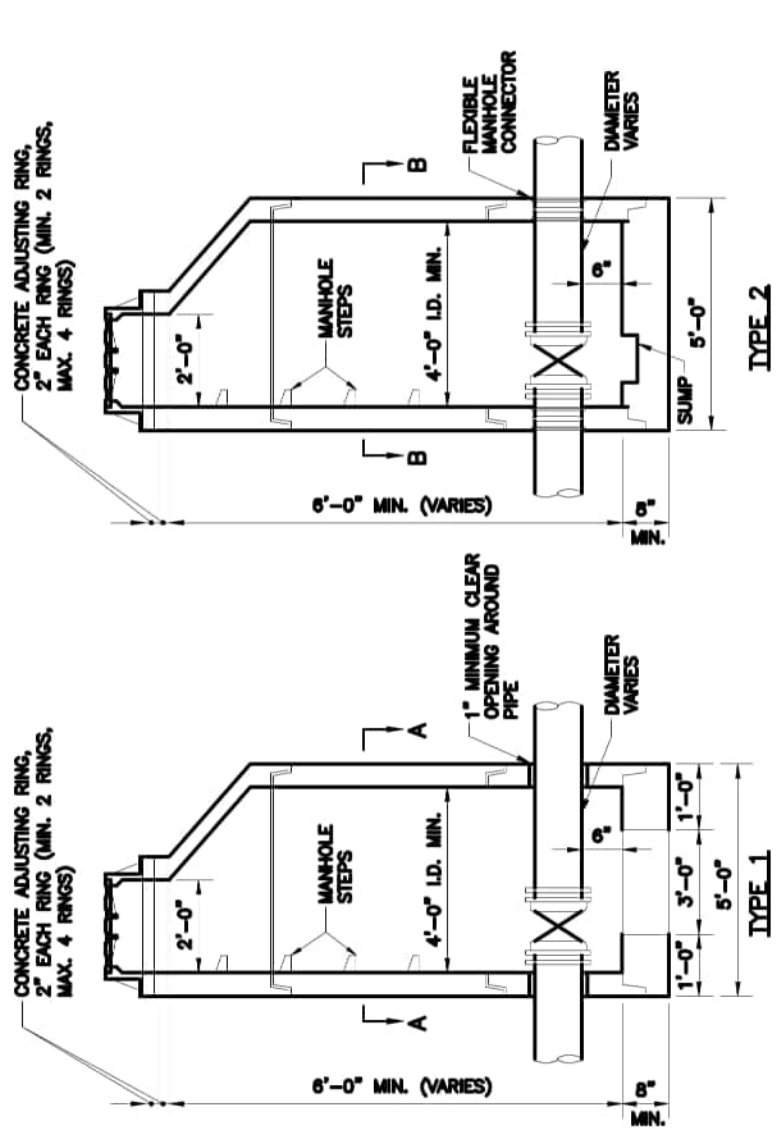
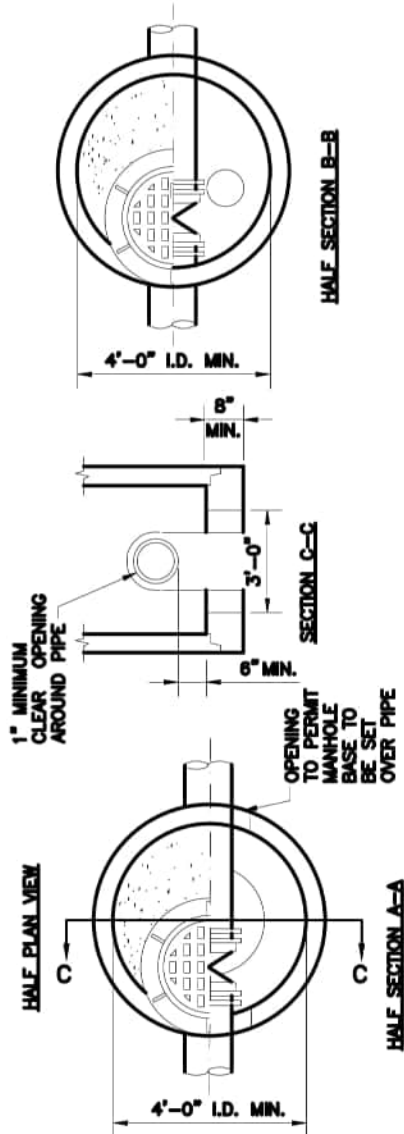


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- NOTES:**
1. TYPE 1 OR 2 MANHOLE SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS. TYPE 2 MANHOLE SHALL BE MADE WATERTIGHT AND SHALL BE USED WHEN NORMAL GROUND WATER LINE IS ABOVE BOTTOM SLAB.
 2. VARIATION IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.
 3. WHEN ANY STRUCTURE IS CONSTRUCTED OF CONCRETE, CONCRETE BLOCK, OR REINFORCED CONCRETE CULVERT PIPE, THE TOP OF THE MASONRY SHALL BE LEFT SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE BY THE USE OF MORTAR.
 4. CONCRETE BLOCK MANHOLES REVIEWED BY THE ENGINEER WILL BE PERMITTED AS AN ALTERNATE. BACK PLASTER OUTSIDE OF ALL CONCRETE BLOCK. CONCRETE BLOCK MANHOLE WALLS SHALL BE 2 BLOCKS THICK BELOW DEPTHS OF 10 FEET.
 5. REINFORCED PRECAST FLAT SLAB SHALL BE USED IN LIEU OF PRECAST ECCENTRIC CONE AS SHOWN ON THE DRAWINGS AS NEEDED TO INSTALL EQUIPMENT OR VALVES.
 6. PRECAST REINFORCED CONCRETE MANHOLE RISERS AND TOPS SHALL CONFORM TO ASTM C-478. JOINTS BETWEEN SECTIONS SHALL BE SEALED WATERTIGHT WITH KENT SEAL, RAM NEX OR EQUAL.
 7. STEPS SHALL BE INSTALLED IN ALL MANHOLES. MANHOLE STEPS SHALL BE NEEDHAM TYPE R-1981-N, MA INDUSTRIES NO. PS-4, OR EQUAL, 1'-4" O.C.
 8. MANHOLE COVER SHALL BE NEEDHAM TYPE R-1550, OR EQUAL, WITH TYPE B NON-ROCKING LID.
 9. TYPE 1 MANHOLE SHALL BE FILLED WITH CLEAN BEDDING UP TO THE BOTTOM OF THE PIPE.
 10. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS.
 11. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.
 12. BASE SLABS SHALL BE REINFORCED AS FOLLOWS. REINFORCING SHALL BE PLACED IN EACH DIRECTION AT 2" CLEAR FROM TOP SURFACE OF SLAB. REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.



INSIDE DIA.	DEPTH	REIN.
4'	≤ 30"	#3@8"
5'	≤ 20"	#3@8"
5'	20'-30'	#4@10"
6'	≤ 20"	#4@10"
6'	20'-25'	#4@8"
6'	25'-30'	#4@6"

WATER MAIN VALVE MANHOLES

STANDARD DETAIL



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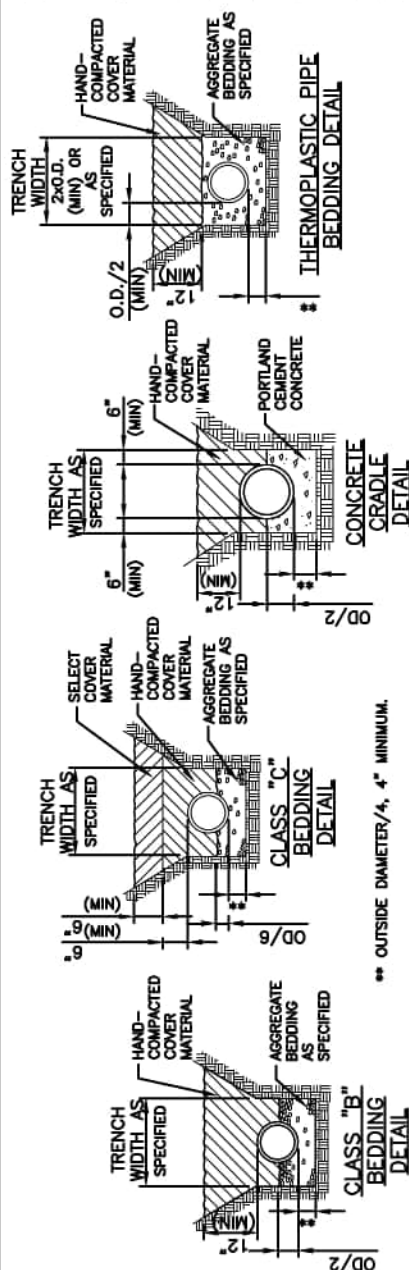
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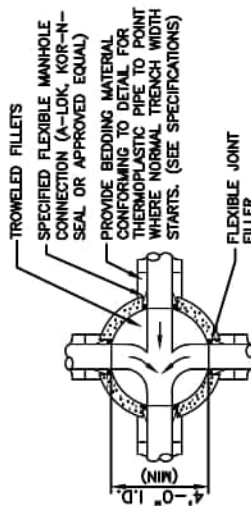
1. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.
2. VARIATIONS IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE, PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.
3. ALL CONCRETE FILLETS SHALL BE HAND TROWELED WITH A 1/4" FT. SLOPE.
4. INSIDE DIMENSIONS FOR MANHOLES: USE MINIMUM 4" DIAMETER FOR SEWER LESS THAN 18" IN DIAMETER; USE MINIMUM 5" DIAMETER FOR SEWER 18" THRU 24" IN DIAMETER; USE MINIMUM 6" DIAMETER OR MINIMUM 6' SQUARE FOR SEWER OVER 24" IN DIAMETER.
5. BEDDING CLASSES "B" AND "C" SHALL MEET OR EXCEED ASTM C12 REQUIREMENTS.
6. DROP TYPE ENTRANCE TO STANDARD MANHOLE WILL BE PAID FOR SEPARATELY IF SO LISTED IN THE BID.
7. SEE DRAWINGS FOR DROP TYPE ENTRANCES FOR SANITARY SEWERS LARGER THAN 15".
8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF REGULATORY BODIES OF THE STATE AND APPLICABLE MUNICIPAL ORDINANCES.
9. ALL NEW CONSTRUCTION SHALL BE PLACED ON UNDISTURBED EARTH OR STONE BEDDING.
10. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.
11. BASE SLABS SHALL BE REINFORCED AS FOLLOWS: REINFORCING SHALL BE PLACED IN EACH DIRECTION AT 2" CLEAR FROM TOP SURFACE OF SLAB. REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.

INSIDE DIA.	DEPTH	REINF.
4'	≤ 30'	#3@8"
5'	≤ 20'	#3@8"
5'	20'-30'	#4@10"
6'	≤ 20'	#4@10"
6'	20'-25'	#4@8"
6'	25'-30'	#4@6"

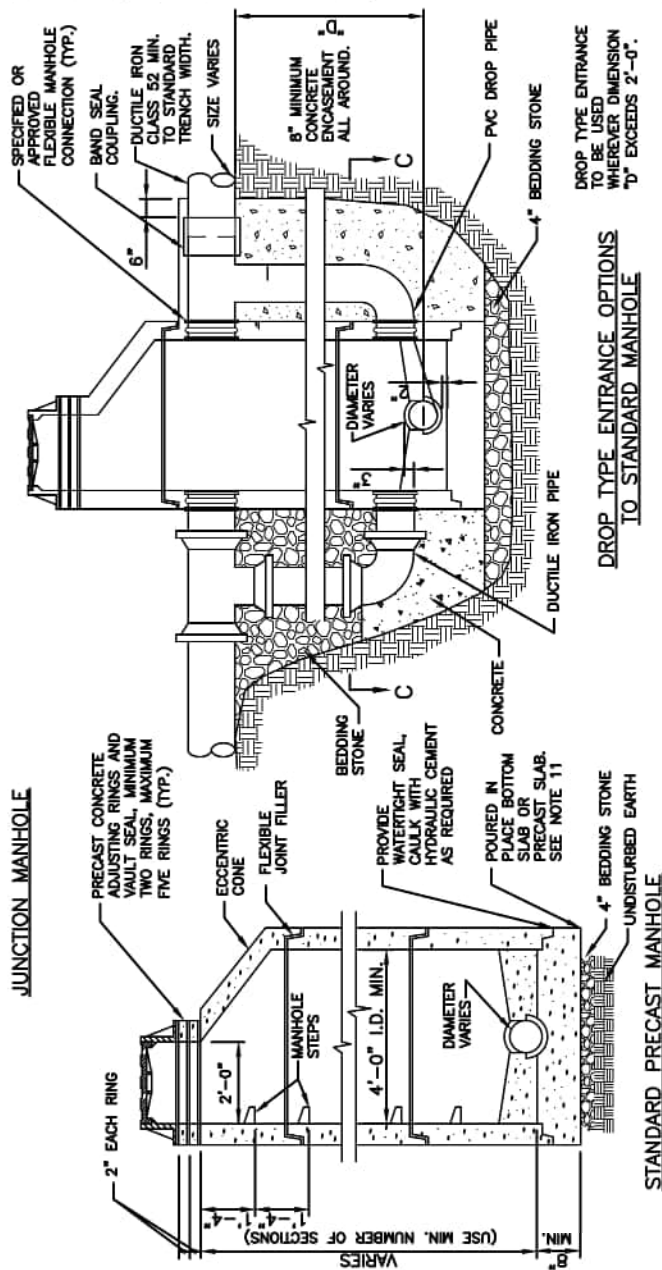
12. FLAT SLABS SHALL BE PROVIDED IN SHALLOW DEPTH SITUATIONS IN LIEU OF ECCENTRIC CONES.



** OUTSIDE DIAMETER/4, 4" MINIMUM.



JUNCTION MANHOLE



DROP TYPE ENTRANCE OPTIONS TO STANDARD MANHOLE

SANITARY SEWER APPURTENANCES

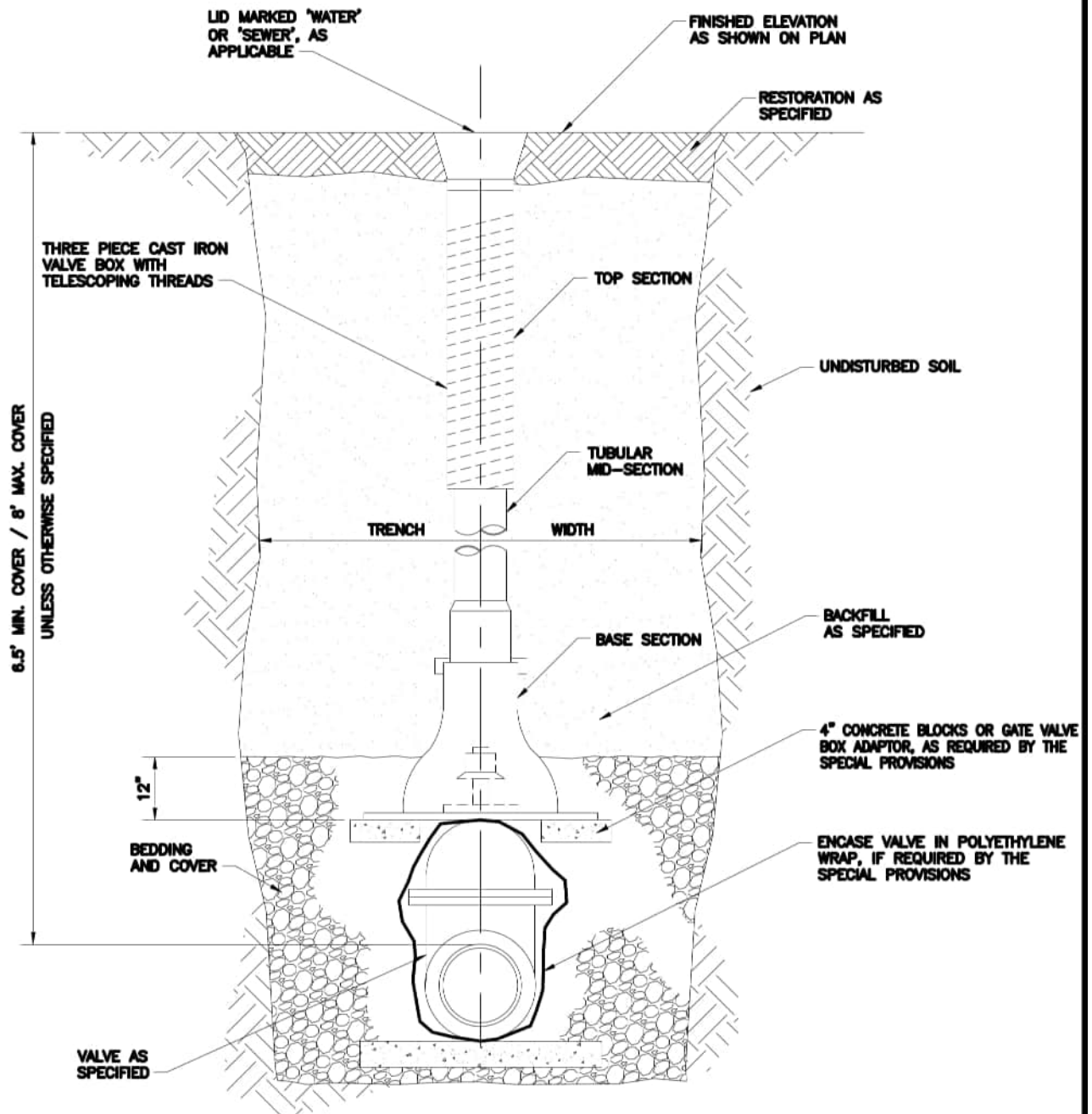
STANDARD DETAIL



01-975-43A

OCTOBER 2011

File: T:\MAD\APPS\ACAD\ALL-STRAND\STD-DWG\Madison Files\Std-064A.dwg Time: Oct 18, 2011 - 10:31am



STANDARD BURIED GATE VALVE BOX SETTING

STANDARD DETAIL



01-975-64A

OCTOBER 2011

SAMPLE DRAWINGS

CONDUCTORS

CONDUCTOR

CONDUCTORS NOT CONNECTED

CONDUCTORS CONNECTED

CONDUCTOR SHIELD

FIELD CONDUCTOR

EARTH GROUND

CHASSIS GROUND

SHIELD GROUND (REQUIRED IF REQUIRED BY SPEC.)

TERMINALS

TERMINAL BLOCK FOR FIELD TERMINATION

TERMINAL BLOCK FOR INTERNAL USE ONLY

DEVICE TERMINATION POINT

FUSED TERMINAL BLOCK FOR DEVICES LOCATED INTERNALLY

RELAY COILS

DEVICE ID

CONTROL RELAY

MOTOR STARTER

ELECTRIC TIMER WITH ADJUSTABLE TIMING RANGE

SOLENOID

THERMAL OVERLOAD

DEVICE ID / DRAWING CROSS REFERENCE

SEQUENCE 00-99

DRAWING CROSS REFERENCE 1-99

FAMILY CODE ABBREVIATION

EXAMPLE: CRE101

SWITCHES

DESCRIPTION TEXT (EXAMPLE: LAMP TEST)

NORMALLY OPEN PUSH-BUTTON

NORMALLY CLOSED PUSH-BUTTON

NORMALLY CLOSED HUSHED ON HEAD

E-STOP

MECHANICAL CONNECTION

TWO POSITION SELECTOR SWITCH SHOWN IN 'POS1'

CONTACT MADE IN 'POS2'

THREE POSITION SELECTOR SWITCH SHOWN IN 'POS1'

POSITION INDICATES SPRING RETURN FROM 'POS3'

CONTACT MADE IN 'POS3'

FOUR POSITION SELECTOR SWITCH SHOWN IN 'POS1'

POSITION

CONTACT MADE IN 'POS3'

LIMIT SWITCHES

NORMALLY OPEN

NORMALLY CLOSED

NORMALLY OPEN HELD CLOSED

NORMALLY CLOSED HELD OPEN

PROCESS SWITCHES

TORQUE SWITCH NORMALLY OPEN CLOSE ON INCREASE TORQUE

TORQUE SWITCH NORMALLY CLOSED OPEN ON INCREASE TORQUE

LIQUID LEVEL SWITCH NORMALLY OPEN CLOSE ON RISE

LIQUID LEVEL SWITCH NORMALLY CLOSED OPEN ON RISE

FLOW SWITCH NORMALLY OPEN CLOSE ON INCREASE FLOW

FLOW SWITCH NORMALLY CLOSED OPEN ON INCREASE FLOW

PRESSURE SWITCH NORMALLY OPEN CLOSE ON RISE

PRESSURE SWITCH NORMALLY CLOSED OPEN ON RISE

TEMPERATURE SWITCH NORMALLY OPEN CLOSE ON RISE

TEMPERATURE SWITCH NORMALLY CLOSED OPEN ON RISE

PILOT LIGHTS

PILOT LIGHT COLOR: AMBER

COLOR CODES

A-AMBER

B-BLUE

G-GREEN

PUSH TO TEST PILOT LIGHT

INPUT/OUTPUT DEVICES

DIGITAL INPUT ADDRESS RACK/SLOT/POINT

DIGITAL OUTPUT ADDRESS RACK/SLOT/POINT

ANALOG INPUT ADDRESS RACK/SLOT/POINT

ANALOG OUTPUT ADDRESS RACK/SLOT/POINT

COIL CONTACTS

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

NORMALLY OPEN CONTACT ON DELAY

NORMALLY CLOSED CONTACT ON DELAY

NORMALLY OPEN CONTACT OFF DELAY

NORMALLY CLOSED CONTACT OFF DELAY

WIRE COLOR STANDARDS

BLACK, INCORPORATING POWER AC

WHITE, NEUTRAL AC

GREEN, GROUND

RED, CONTROL POWER AC

BLUE, CONTROL POWER DC

BLUE WITH STRIP, CONTROL POWER COMMON DC

SHIELDED 2 CONDUCTOR BLACK/WHITE

YELLOW, SEPARATE EXTERNAL CONTROL POWER SOURCE

RESERVED WIRE NUMBERS

GROUND FAULT CIRCUIT HOT

GROUND FAULT CIRCUIT NEUTRAL

24V DC POSITIVE

24V DC COMMON

10

12V DC POSITIVE

12V DC COMMON

24V DC POSITIVE

24V DC COMMON

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

MISCELLANEOUS

CIRCUIT BREAKER WITH AMPERAGE

FUSE WITH AMPERAGE

AUDIBLE DEVICE

ELAPSED TIME METER

RESISTOR 250 OHM

RECTIFIER, DIODE

CAPACITOR, ELECT

TRANSFORMER SECONDARY VOLTAGE AND RATING INDICATED AS APPLICABLE

INSTRUMENTATION DEVICES

SUBPANEL MOUNTED DEVICE WITH LOOP OR SEQUENCE NUMBER

PANEL MOUNTED DEVICE WITH LOOP OR SEQUENCE NUMBER

FIELD MOUNTED DEVICE WITH LOOP OR SEQUENCE NUMBER

ISA CODES

F1 - FLOW RATE INDICATOR

F2 - FLOW INDICATOR

F3 - FLOW TRANSMITTER

F4 - FLOW INTEGRATOR

F5 - FLOW QUANTITY

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

PROJECT

DATE 12/12/2007

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DATE 12/12/2007

PROJECT

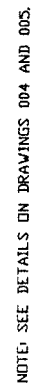
DATE LAST EDITED: 12/16/2007

Sample symbol sheet

Standard Abbreviations

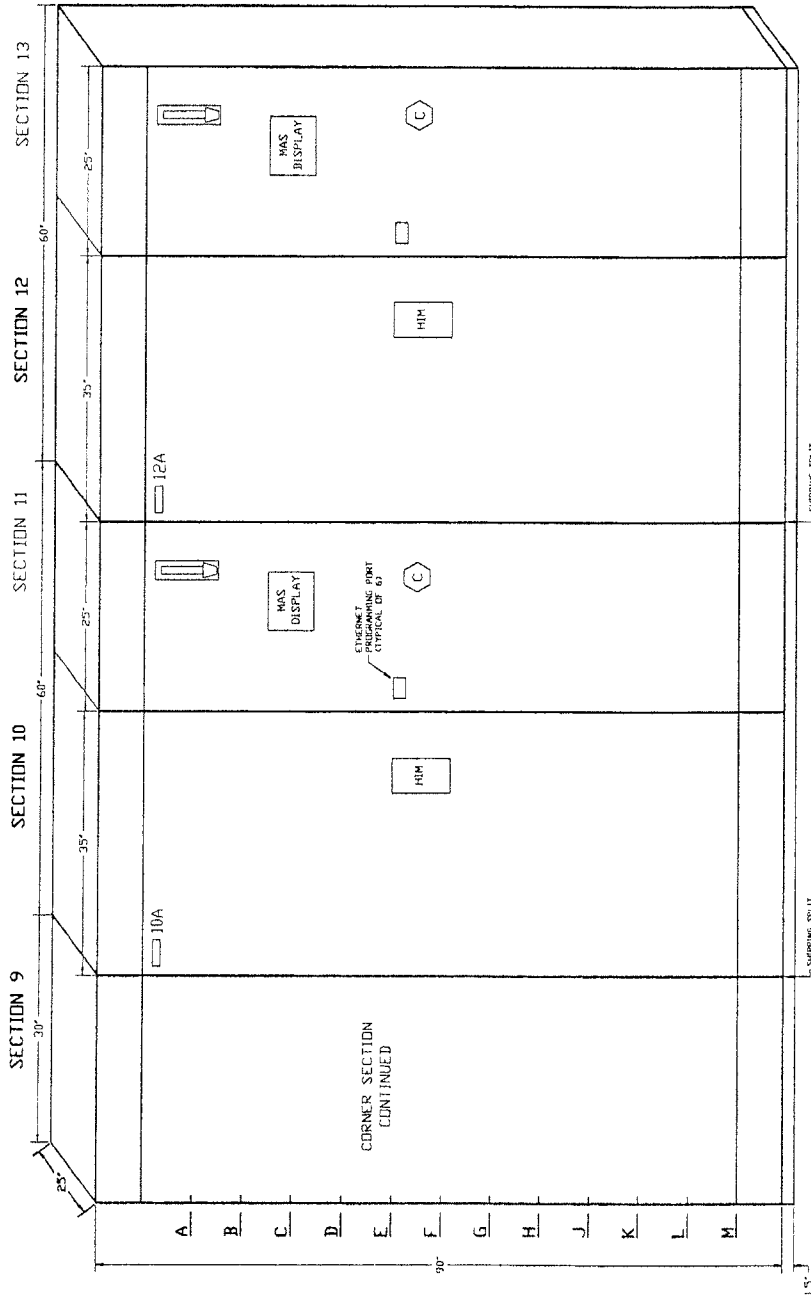
<u>Abbreviation</u>	<u>Description</u>	<u>Abbreviation</u>	<u>Description</u>
A	Air Compressed	OV	Overvoltage
AC	Air Condition	PB	Pushbutton
AD	Auto Dialer	PC	Pull Cord
AH	Alarm Horn	PC	Personal Computer
AL	Alarm Light	PFC	Power Factor Capacitor
AM	Amp Meter/Ammeter	PL	Pilot Light
ANN	Annunciator	PLC	Programmable Logic Controller
AR	Alternating Relay	PM	Power or Phase Monitor
AWG	American Wire Gauge	PN	Pneumatic
BA	Battery	PR	Pressure Regulator
BLU	Blue	PS	Pressure Switch
BRN	Brown	PS	Power Supply
CA	Cable	PSH	Pressure Switch High
CB	Circuit Breaker	PSL	Pressure Switch Low
CR	Control Relay	REC	Receptacle
CT	Current Transformer	SP	Surge Protector
DB	Distribution Block	SS	Selector Switch
DI	Diode	STP	Shielded Twisted Pair
DS	Disconnect Switch	SV	Solenoid Valve
EC	Electronic Control Device	TD	Time Delay Relay
ETM	Elapsed Time Meter	TG	Toggle Switch
EN	Enclosure	TS	Temperature Switch
FO	Fiber Optic	TSP	Twisted Shielded Pair
FS	Flow Switch	TT	Temperature Transmitter
FU	Fuse	UPS	Uninterruptible Power Supply
GFI	Ground Fault Interrupter	UTP	Unshielded Twisted Pair
GND	Ground	VA	Voltampere
GRN	Green	VFD	Variable
HTR	Heater	VM	Voltmeter
LA	Lightning Arrestor	WHT	White
LP	Lighting Panel	WS	Weight Switch
LR	Latching Relay	WT	Weight Transmitter
LS	Level Switch	XFMR	Transformer
MS	Motor Starter Contactor	SI	Signal Isolator
M	Motor	SS	Speed Switch
NP	Nameplate	ZS	Position Switch
OIT	Operator Interface Terminal		
OL or O/L	Overload		
ORG	Orange		

Sample List of
Abbreviations



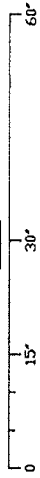
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DWN	JA
CKD	GK
ENGR.	BA
ASSEM	
SHEET	4 OF 149

Sample Exterior
Layout Drawing



NOTE: SEE DETAILS ON DRAWINGS 004 AND 005.
SECTIONS 10 THROUGH 13 ARE MOUNTED BACK-TO-BACK
WITH SECTIONS 14 THROUGH 17.

SCALE

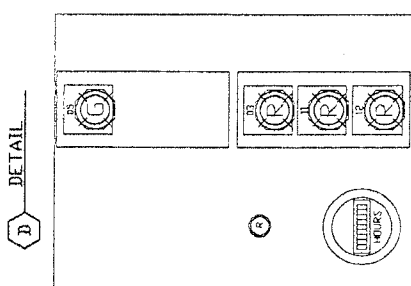
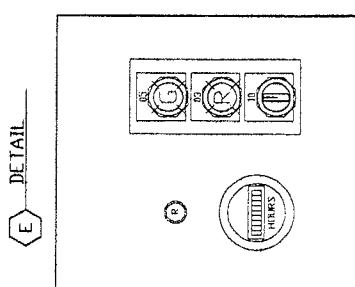
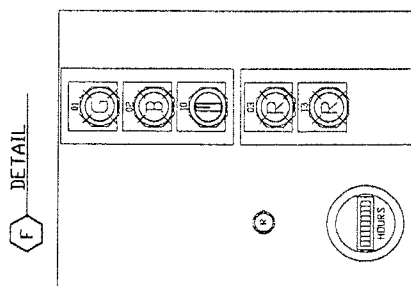
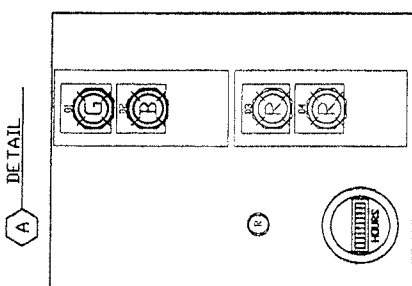
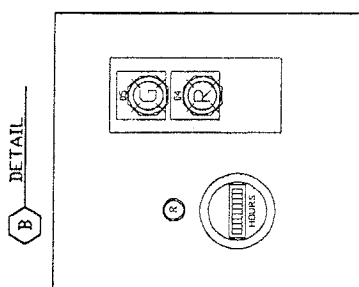
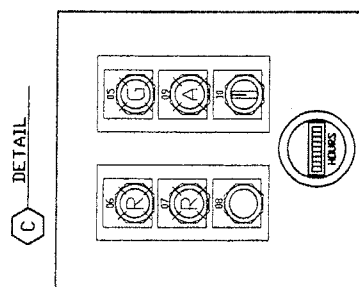
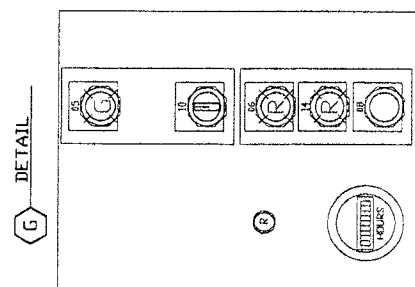
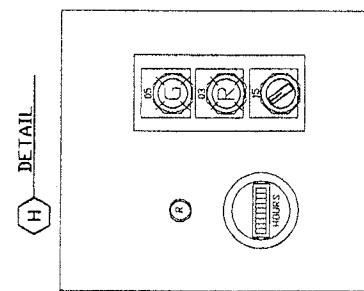


DATE	REVISION
6/12/05	RELEASE FOR CONSTRUCTION
9/16/06	AS BUILT
2/15/07	AS INSTALLED

DATE LAST EDITED 2/15/2007

DATE	3/16/06	PROJECT
DATE	3/16/06	PROJECT
ENGR.	BA	MCC-10
ASST.	BA	ELEVATION DETAIL
SHEET	6 OF 149	
PROJ. NO.		003D
DWG. NO.		003D

Sample Exterior
Layout Drawing



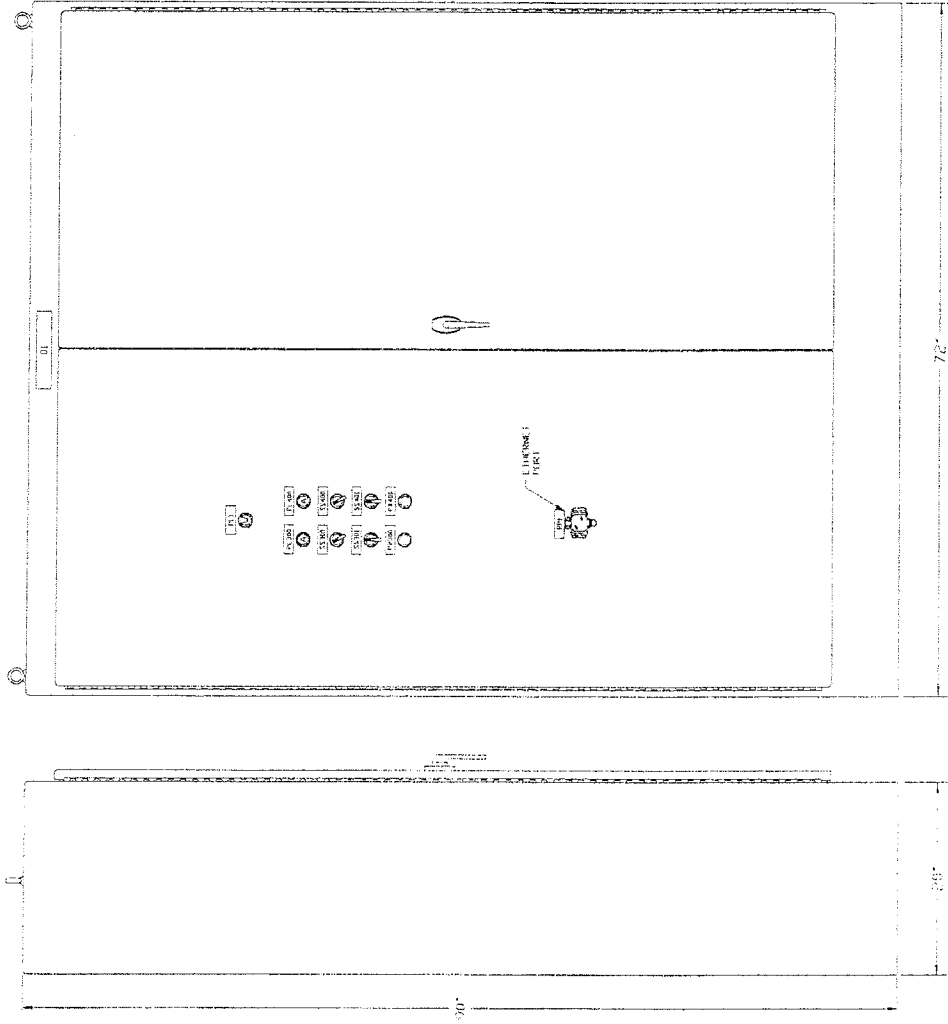
TAG	BS CI	LEGEND PLATE		SCHEDULE		REMARKS
		DESIGN	DESIGN	SIZE	SIZE	
01	REWARD			1-13/16"	SQ	
02	REVERSE			1-13/16"	SQ	
03	OVERLOAD			1-13/16"	SQ	
04	OVERCURRENT			1-13/16"	SQ	
05	RUN			1-13/16"	SQ	
06	VOLT FAULT			1-13/16"	SQ	
07	MOTOR/FEARING			1-13/16"	SQ	
08	RESET			1-13/16"	SQ	
09	JIBCR/MOTOR			1-13/16"	SQ	
10	HAND AUTO			1-13/16"	SQ	
11	STOP SPEED			1-13/16"	SQ	
12	STOP			1-13/16"	SQ	
13	STOP ACTION			1-13/16"	SQ	
14	STOP			1-13/16"	SQ	
15	STOP			1-13/16"	SQ	

DATE	REVISION
6/13/05	DESCRIPTION
9/6/06	RELEASE FOR CONSTRUCTION
2/15/07	AS BUILT
	AS INSTALLED

DATE	3/16/06	PROJECT
UN	JA	
CKD	GR	
ENGR	BA	
ASSEM		
35 DEC 10		
PREP. NO.		
INVC. NO.		

Sample Exterior
Layout Drawing

DATE LAST EDITED: 2/15/2007



NAME PLATE SCHEDULE			
TAG	DESC1	DESC2	DESC3
01	SEC-10		SIZE 15x8
PR300	RESET		1X3
PR400	RESET		1X3
PL1	POWER ON UPS		1X3
PL300	INFLUENT	WET WELL NO1	BACKUP FLOODS ACTIVE 1X3
PL400	INFLUENT	WET WELL NO2	BACKUP FLOODS ACTIVE 1X3
SS300	BACKUP PUMPS	ON - AUTO	1X3
SS301	LEAD PUMP	03 - AUTO - 05	1X3
SS400	BACKUP FLOODS	ON - AUTO	1X3
SS401	LEAD PUMP	04 - AUTO - 06	1X3
EP1	ETHERNET	PROGRAMMING PORT	1X3

NAME PLATES ARE BLACK WITH WHITE LETTERS

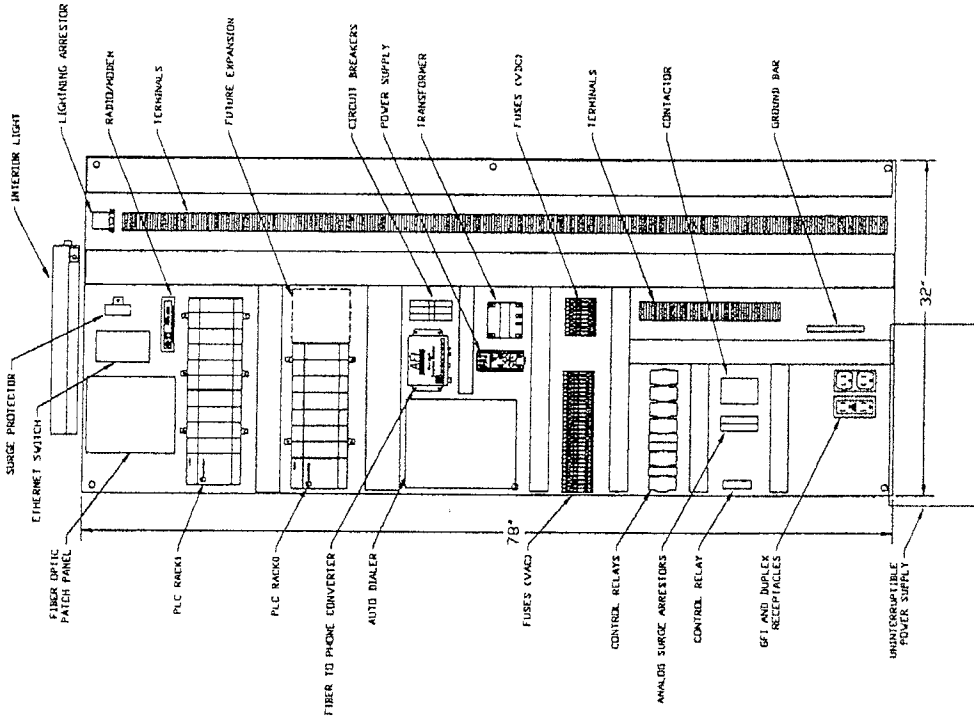
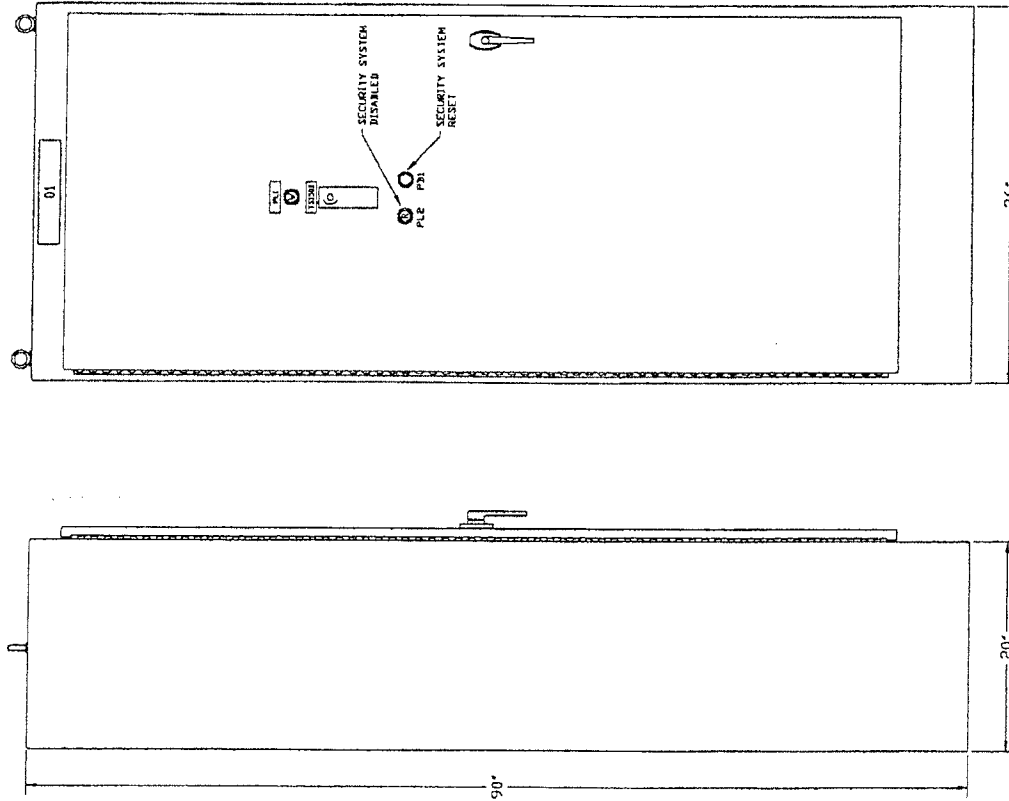
NOTES

- ENCLOSURE IS A NEMA TYPE 12 FREE STANDING HEIGHT MAN A-9072208 SH WITH INNER PANEL HEIGHT MAN A-9087203 1
- FINISH IS ANST 61 GRAY
- CO. # BF-3715336

REVISION	
DATE	DESCRIPTION
8/12/05	RELEASE FOR CONSTRUCTION
9/14/06	AS BUILT
2/15/07	AS INSTALLED

DATE	2/15/07	PROJECT
DATE	2/15/07	ENCLOSURE DETAIL
ENGR	EN	SCALE
ASSN	BN	PROJ. NO.
SHEET	3 OF 143	DWG. NO.

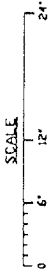
Sample Exterior Layout Drawing



PANEL LAYOUT

NOTES:

1. ENCLOSURE IS A NEMA TYPE 12 FREESTANDING HOFFMAN A903620FS, WITH INNER PANEL HOFFMAN A90P36FL.
2. FINISH IS ANST 61 GRAY.
3. UL 508A



SUBMITTAL USE ONLY
NOT FOR
CONSTRUCTION
DATE LAST EDITED: 12/4/2007

TAG	LINE 1	LINE 2	LINE 3	SIZE	REMARKS
01	SCC-MAN			2x10	
PL1	POWER IN UPS			1x3	
TS1580	LOW BUILDING TEMPERATURE			1x3	

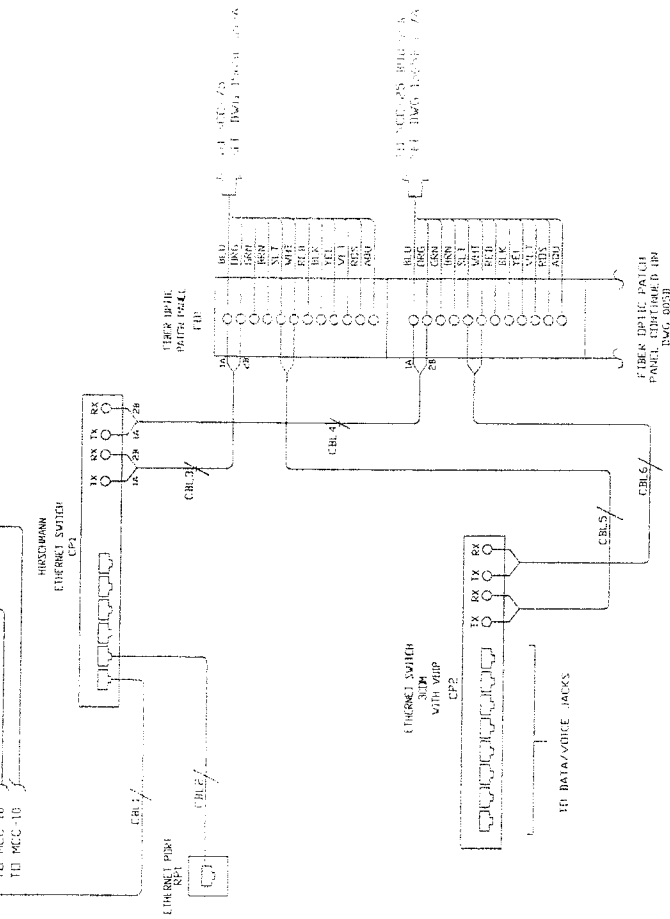
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DATE	REVISION	DESCRIPTION
12/4/2007	1	ISSUED FOR CONSTRUCTION

ENCLOSURE DETAIL

PHILL NO.
PAGE NO.
001

Sample Exterior and Interior Layout
Drawing



QTY	TAGS	DESCRIPTION	PKG.	CATAL NO.
1	R0/S0	PLC PROCESSOR CPU, COMPACT I/O, 12MB MEMORY	ALLEN BRADLEY	1769-L55E
1	R0/S0	120V AC LOGIX POWER SUPPLY	ALLEN BRADLEY	1769-P4A
1	R0/S1	PLC COMM MODULE	ALLEN BRADLEY	1769-SDM
1	R0/S2	BEVEMENT SCANNER	ALLEN BRADLEY	1769-ARM
1	R0/S2	BEVEMENT SCANNER	ALLEN BRADLEY	1769-ARM
1	R0/S3	MODBUS INTERFACE MODULE MODBUS MASTER/SLAVE COMM. MODULE	PROSIT	44169-M2M
1	R0/S4	8 CHANNEL I/O MODULE	ALLEN BRADLEY	1769-IFB
1	R0/S5	14 BIT RESOLUTION 14 BIT RESOLUTION	ALLEN BRADLEY	1769-IFB
1	R0/S6	14 BIT RESOLUTION 14 BIT RESOLUTION	ALLEN BRADLEY	1769-IFB
1	R0/S7	PLC ANALOG I/O MODULE	ALLEN BRADLEY	1769-IFB
1	R0/S8	1769-OF-SC 1769-OF-SC	ALLEN BRADLEY	1769-IFB
1	R0/S10	1769-OF-SC 1769-OF-SC	ALLEN BRADLEY	1769-IFB
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DATE LAST EDITED 11/16/2007

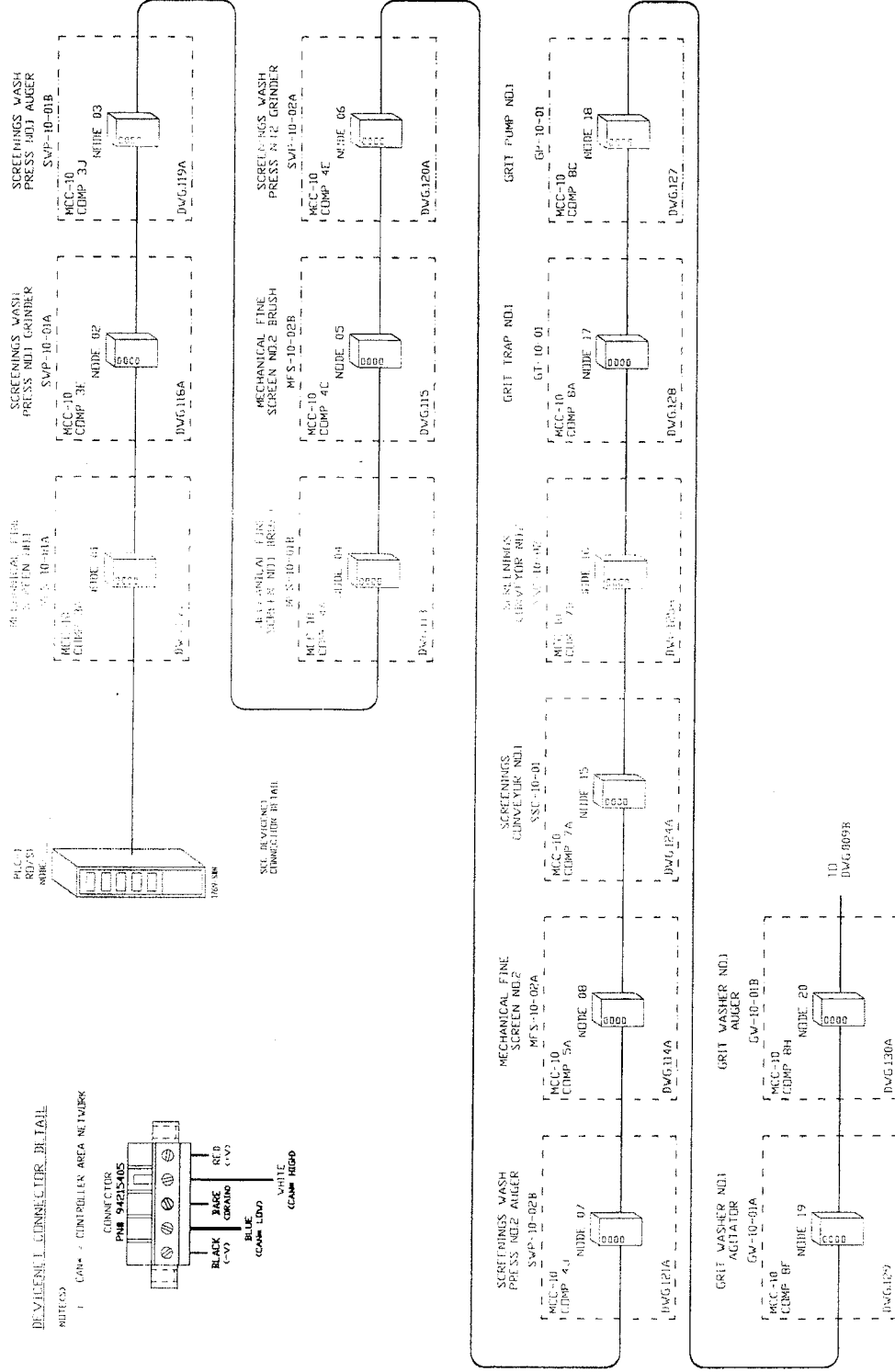
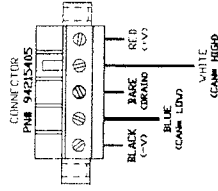
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CND	K	
ENGR	A	
ASSEM		
SHEET	17 OF 149	

SEC-10
PLC I/O SCHEDULE

Sample Interconnection Diagram

DEVELOPER CONNECTOR RAIL

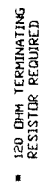
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* 120 OHM TERMINATING RESISTOR REQUIRED

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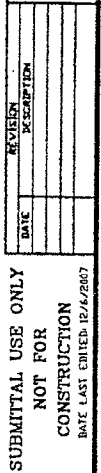
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ASSEM.				
SHEET	19 OF 149			



DATE	TIME	PROJECT	PROJ. NO.
DUN	1A		DWG. NO.
CED	1K	MCC-11	019B
EUGER	1A	DR VICE MT	
ASSEN		NEED ADDRESSING	
SHEET 20 OF 149			

Sample Network Diagram

R0/S0	R0/S1	R0/S2	R0/S3	R0/S4	R0/S5	R0/S6	R0/S7	R0/S8	R0/S9
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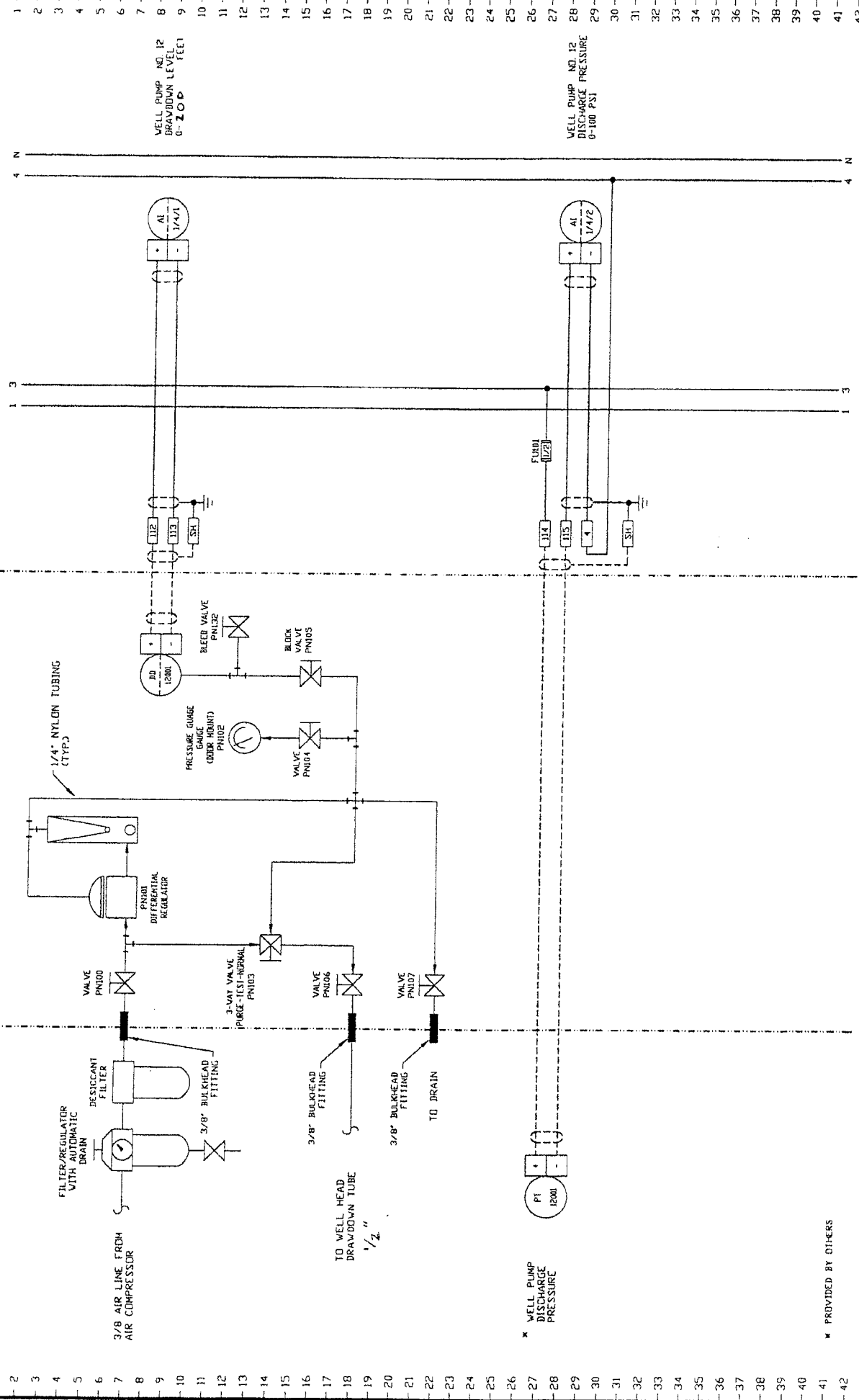
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DWN	JA		
CRK	CK		
ENGR	JJ		
ASSTEN			
SHEET	3 OF 34		

Sample Interconnection Diagram

FIELD OR AS NOTED

DRAWDOWN TRANSDUCER PANEL (1674A1-002)

SCC-MAIN



SUBMITTAL USE ONLY
NOT FOR
CONSTRUCTION
DATE LAST EDITED: 12/10/2007

DATE	REVISION	DESCRIPTION

DATE	11/12/2007	PROJECT
OWN	JA	
DES	GS	
ENG	JJ	
CHKD	8 12 24	
DATE		

SCC-MAIN
WELL PUMP NO. 12

PROJ. NO.
1018

Sample elementary schematic

* PROVIDED BY OTHERS

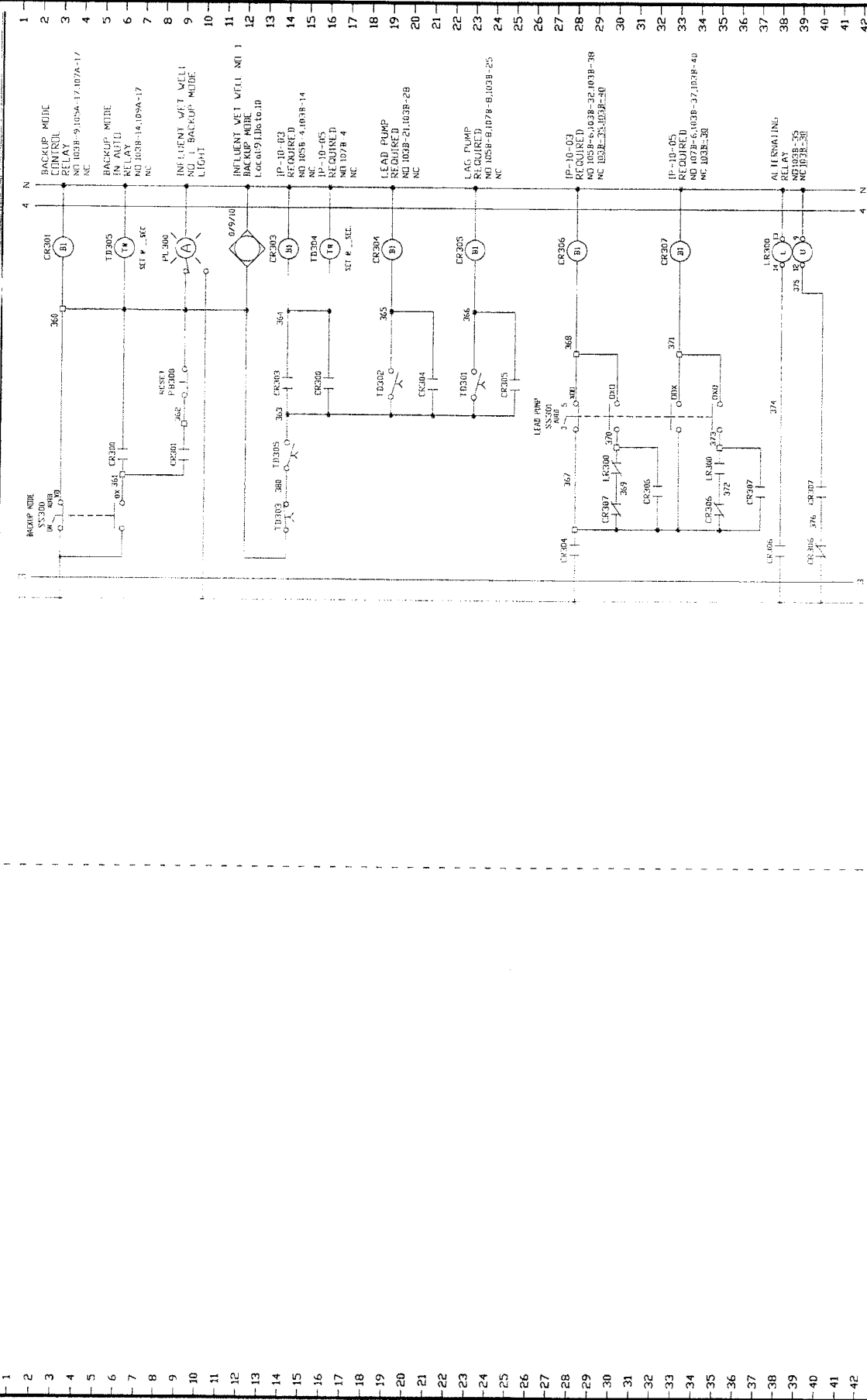
* WELL PUMP
DISCHARGE
PRESSURE

WELL PUMP NO. 12
DRAWDOWN LEVEL
0-200
FEET

WELL PUMP NO. 12
DISCHARGE PRESSURE
0-100 PSI

FIELD OR AS NOTED

SCC-10

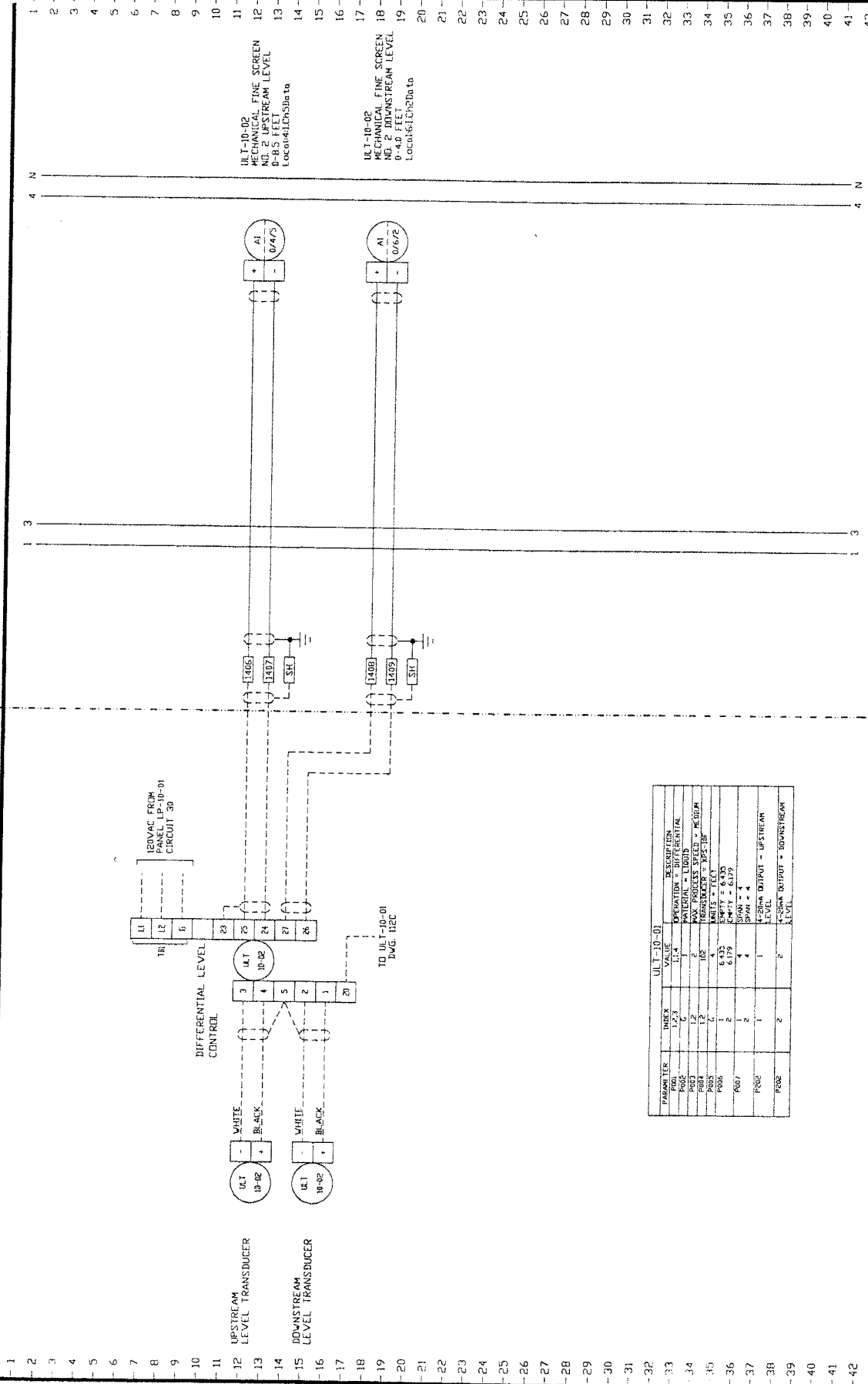


DATE		PROJECT		PROJ. NO.	
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2/1/05	2/1/05	3/16/05	3/16/05	306 NO	306 NO
2/1/05	2/1/05	3/16/05	3/16/05	103B	103B

Sample Elementary Schematic

FIELD OR AS NOTED

SCC-10



						PROJECT	
REVISION		DATE		3/16/06			
DESCRIPTION		DATE		3/16/06			
RELEASE FOR PRODUCTION		DATE		3/16/06			
AS BUILT		DATE		3/16/06			
AS INSTALLED		DATE		3/16/06			

SCC-10	MECHANICAL FINE SCREEN NO.2	PRJ NO.
PH S-10-02A		DWG. NO.
		34C

DATE LAST EDITED: 7/16/2008

Sample Elementary schematic

APPENDIX

**GEOTECHNICAL ENGINEERING
SERVICES REPORT**



REPORT TRANSMITTAL

January 3, 2025

To: Richard Scheer, P.E.
Strand Associates, Inc.®
1170 South Houbolt Road
Joliet, Illinois 60431

Re: **Geotechnical Engineering Services Report**
Western Receiving Station
2305 - 2309 Caton Farm Road
Crest Hill, Illinois

Rubino Report No. G24.156A

Via email: richard.scheer@strand.com; nathan.wisnionski@strand.com

Dear Mr. Scheer,

Rubino Engineering, Inc. is pleased to submit our Geotechnical Engineering Services Report for the proposed Receiving Station and Delivery Structure in Crest Hill, Illinois.

Report Description

Enclosed is the Geotechnical Engineering Services Report including results of field and laboratory testing, as well as recommendations for foundation design and general site development.

Authorization and Correspondence History

- Rubino Proposal No. Q23.257g_REV1 dated November 21, 2023; Agreement For Professional Services signed and authorized by Joseph M. Bunker, Corporate Secretary of Strand Associates, Inc.® on September 10, 2024.

Closing

Rubino appreciates the opportunity to provide geotechnical services for this project and we look forward to continued participation during the design and in future construction phases of this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully submitted,
RUBINO ENGINEERING, INC.

Michelle A. Lipinski, PE
President

michelle.lipinski@rubinoeng.com

MAL/file/ Enclosures

**WESTERN RECEIVING STATION
2305 – 2309 CATON FARM ROAD
CREST HILL, ILLINOIS

RUBINO PROJECT No. G24.156A**

***Geotechnical
Engineering
Services
Report***

*Drilling
Laboratory Testing
Geotechnical Analysis*

**PREPARED BY:
DAVID T. LEWANDOWSKI, PE**

**REVIEWED BY:
MATTHEW KURZ, EI**



**Michelle A. Lipinski, PE
President
IL No. 062-061241, Exp. 11/30/2025**

PREPARED FOR:

**STRAND ASSOCIATES, INC.
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS**

JANUARY 3, 2025

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 Appendix B – Site Preparation – Clearing & Grubbing
 Appendix C – Fill Recommendations
 Appendix D – Foundation Construction Recommendations
 Appendix E – Slab-on-Grade Considerations
 Appendix F – Report Limitations
 Appendix G – Soil Classification General Notes
 Appendix H – Soil Classification Chart
 Appendix I – Site Vicinity Map & Boring Location Plan
 Appendix J – Boring Logs
 Appendix K – Laboratory Results

PROJECT INFORMATION

Rubino Engineering, Inc. (Rubino) understands that Strand Associates, Inc.[®] (Strand) is planning the addition of a new receiving station and delivery structure at the Western Receiving Station site in Crest Hill, Illinois. The proposed structures are as follows:

West Receiving Station:

- Plan dimensions 22-ft. by 34-ft.
- Slab-on-grade construction with finished floor at approximately EL. 630 ft.
- Site grading includes fills of approximately 2 feet to achieve finished floor elevation.
- Frost wall foundations, masonry walls and a precast concrete plank roof.
- Maximum wall loads of approximately 1.8 klf vertical and 34 psf lateral (unfactored service loads).
- Floor Slab 100 psf live load.

West Delivery Structure:

- Plan dimensions 22-ft.-4 in. by 18-ft.-9 in.
- Cast-in-place below grade structure.
- Mat slab foundation.
- Mat thickness 1 ft.-8 in.
- Proposed bottom of mat approximately at EL. 615 ft. (approximately 13 feet below existing grade)
- Proposed sump within mat extends to approximately EL. 613 ft.
- Total unfactored weight on mat slab = 315,252 lbs.
 - o Total Dead Weight = 294,000 Pounds.
 - o Total Water Storage Weight = 21,252 Pounds.

Driveways and Access Roads:

- Site grading including cuts and fills being less than 2 feet.
- PCC pavement.

Documents received:

- "1-ASM1.01", Receiving and Pumping Station Floor Plans, Figure 26, prepared by Strand, received on May 15, 2023
- "Delivery Sites for Geot Tech 11x17_Optimized" – Proposed Secondary Delivery Point, Figure 25, prepared by Strand, received on May 15, 2023
- "G24.156A Western Site_Boring Coordinates" – boring elevations included in document received on November 22, 2024
- "Exhibit for Geotech 9-18-23" – Site Plan, prepared by Strand, received on September 28, 2023

Project Correspondence:

- RFP Email from Nathan Wisnionski of Strand dated May 15, 2023



- Email from Richard Scheer, P.E. of Strand dated September 28, 2023 – project description
- Authorization to proceed via Agreement signed by Joseph M. Bunker of Strand on September 10, 2024.
- Email from Richard Scheer, P.E. of Strand dated November 22, 2024 – boring elevations and structural design information
- Email from Richard Scheer, P.E. of Strand dated December 12, 2024 – information from tank manufacturer

The geotechnical recommendations presented in this report are based on the available project information and the subsurface materials described in this report. If any of the information on which this report is based is incorrect, please inform Rubino in writing so that we may amend the recommendations presented in this report (if appropriate, and if desired by the client). Rubino will not be responsible for the implementation of our recommendations if we are not notified of changes in the project.

Purpose / Scope of Services

The purpose of this study was to explore the subsurface conditions at the site in order to prepare geotechnical recommendations for foundation design and general site development for the proposed construction. Rubino's scope of services included the following drilling program:

Table 1: Drilling Scope

BORINGS	DEPTH (FEET BEG*)	LOCATION
W-01 – W-03	25	Receiving Station
W-04	30	Delivery Structure
W-05 – W-06	10	Access Drive

*BEG = below existing grade

Representative soil samples obtained during the field exploration program were transported to the laboratory for additional classification and laboratory testing.

This report briefly outlines the following:

- *Summary of client-provided project information and report basis*
- *Overview of encountered subsurface conditions*
- *Overview of field and laboratory tests performed including results*
- *Geotechnical recommendations pertaining to:*
 - *Subgrade preparation and cut / fill recommendations*
 - *Shallow foundations, including suitable foundation type(s), allowable bearing pressure(s), and estimated settlement*
 - *Seismic design site classification parameters*
- *Construction considerations, including temporary excavation and construction control of water*



DRILLING, FIELD, AND LABORATORY TEST PROCEDURES

In consultation with Strand, Rubino selected the number of borings and the boring depths. Rubino located the borings in the field by measuring distances from known fixed site features with the aid of a handheld GPS instrument. The borings were advanced utilizing 2 ¼ inch inside-diameter, hollow stem auger drilling methods and soil samples were routinely obtained during the drilling process.

Selected soil samples were tested in the laboratory to determine material properties for this report. Drilling, sampling, and laboratory tests were accomplished in general accordance with ASTM procedures. The following items are further described in the Appendix of this report.

- *Field Penetration Tests and Split-Barrel Sampling of Soils (ASTM D1586)*
- *Field Water Level Measurements*
- *Laboratory Determination of Water (Moisture) Content of Soil by Mass (ASTM D2216)*
- *Laboratory Determination of Atterberg Limits (ASTM D4318)*

The laboratory testing program was conducted in general accordance with applicable ASTM specifications. The results of these tests are to be found on the accompanying boring logs located in the Appendix.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The subject site is located along the south side of Caton Farm Road between Greengold Street and Lynwood Street. At present, the site is covered by grass with several trees. The ground surface is relatively level as indicated by the approximate boring elevations ranging from EL. 628.2 feet to EL. 628.7 feet.





The midpoint of the project site has an approximate latitude and longitude of 41.5656° and -88.1384°, respectively.

Subsurface Conditions

Beneath the existing surficial topsoil, subsurface conditions generally consisted of possible fill, dark gray and black high plasticity silty clay, brown and/or gray silty clay and clayey silt.

- The **topsoil** thickness ranged between approximately 10 and 16 inches.
- The **possible fill** soils were generally cohesive in nature.
- The native **silty clay / clayey silt** soils were generally medium stiff to very stiff in consistency.
 - **High plasticity silty clay** was encountered at one boring location.
- The native **sandy silt** soils were generally medium dense in apparent density.



Table 2: Subsurface Conditions Summary

APPROXIMATE ELEVATION RANGE (FEET)	SOIL DESCRIPTION	SPT N- VALUES (BLOWS PER FOOT)	MOISTURE CONTENT (%)	ESTIMATED SHEAR STRENGTH
RECEIVING STATION (W-01 – W-03)				
627 ½ - 603	Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel	9 - 17	12 - 22	c ≅ 1,350 – 2,400 psf
625 - 622	Stiff, brown and gray SILT, trace sand and gravel (W-02)	8	19	c ≅ 500 – 650 psf
605 - 603	Medium stiff, gray silty CLAY, trace sand and gravel (W-03)	7	22	c ≅ 850 – 1,000 psf
DELIVERY STRUCTURE (W-04)				
627 - 625	Black, dark brown and dark gray silty clay, trace sand and gravel <i>Possible Fill</i>	9	13	—
625 – 622 ½	Stiff, brown sandy silty CLAY, with gravel	14	7	c ≅ 1,700 – 2,100 psf
622 ½ - 598 ½	Stiff, brown and gray silty CLAY, trace sand and gravel	9 - 12	15 - 23	c ≅ 1,350 – 1,800 psf
ACCESS DRIVE (W-05 – W-06)				
627 - 625	Dark gray and black HIGH PLASTICITY SILTY CLAY, trace sand and gravel <i>Possible Fill (B-06)</i>	11	19	—
627 ½ - 618	Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel	9 - 16	15 - 20	c ≅ 1,350 – 2,400 psf

The native soils were visually classified as silty clay (CL), clayey silt (CL-ML), high plasticity silty clay (CH) and sandy silt (ML) according to the Unified Soil Classification System (USCS). The above table is a general summary of subsurface conditions. Please refer to the boring logs for more detailed information.

Estimated shear strength of clay soils is based on empirical correlations using N-values, moisture content, and unconfined compressive strength, as applicable.

Groundwater Conditions

Groundwater was not observed in the borings during the drilling operation due to the low permeability of the encountered soils. Based on the color change of the soils from brown to gray in borings W-01 through W-04, Rubino estimates that groundwater may be approximately in the elevation range from EL. 619 feet to EL. 615 feet (9 ½ to 13 ½ feet below the existing ground surface).



It should be noted that fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. Groundwater may not have been observed in some areas due to the low permeability of soils. Additionally, discontinuous zones of perched water may exist within the soils. The possibility of groundwater level fluctuation should be considered when developing the design and construction plans for the project.

When bidding this project, the contractor should anticipate that groundwater will be present during excavation.

Undocumented Fill Discussion

Possible undocumented fill was observed in borings W-04 and W-06 to an elevation of approximately EL. 625 feet (depth of approximately 3 ½ feet below existing grade).

Where existing fill is encountered, Rubino recommends that structure foundations extend through the fill materials and be supported on suitable soils, cured flowable fill, or compacted and documented structural fill.

Undocumented fill is defined as fill that has been placed without being documented as to its placed density and moisture content.

Deleterious materials could include, but are not limited to, bricks, asphalt, concrete, metal, wood, or other building debris.

Undocumented fill materials should be carefully evaluated by proof-rolling and subgrade stability testing (as recommended herein) at the time of construction to document the in-place consistency of these materials.

Deleterious materials were not observed within the possible undocumented fill materials during the drilling operations. Although deleterious materials were not encountered in all the possible undocumented fill materials, this does not eliminate the possibility that deleterious materials could be present within undocumented fill materials at other locations along the project.

Expansive Soil Discussion

Soils with low to moderate expansive properties were observed in boring W-06 to elevations ranging from approximately EL. 627 feet to EL. 625 feet (approximately 1 to 3 ½ feet below existing grade) during the drilling operations. There is a possibility that expansive soils could be encountered at other locations on the site.



Table 3: Expansive Soils by Location

BORING NUMBER / LOCATION	SOIL DESCRIPTION	APPROXIMATE ELEVATION / DEPTH RANGE (FEET BEG*)	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)
W-06 / Access Drive	Dark gray and black HIGH PLASTICITY SILTY CLAY, trace sand and gravel <i>Possible Fill</i>	627 – 625 / 1 – 3 ½	54	34

*BEG = below existing grade

Expansive soils are considered unsuitable for construction due to their tendency to absorb moisture from the ground or atmosphere which causes swelling and, in turn, an increase in volume. Soils with Liquid Limits greater than 50% (LL > 50%) may exhibit highly plastic behavior and may be considered to have expansive properties (*IDOT Standard Specifications, 2022*).

Expansive soils have high frost susceptibility and may have higher moisture contents which could contribute to failed proof rolls, however expansive soils are difficult to visually delineate in the field during construction.

Where expansive soils are encountered, subgrade treatment options may include, but are not limited to:

- Below Pavements: Provide surface and subsurface drainage techniques to reduce moisture changes in the soil (transverse and longitudinal underdrains tied into the storm sewer system)
- Below Structures or pavements: Removal of the high plasticity soils and replacement with structural fill

Topsoil Discussion

Topsoil materials as described in this report have not been analyzed for quality according to any minimum specifications. If topsoil is to be imported to or exported from this site, Rubino recommends that it meet the minimum specifications defined in **Section 1081.05** of the *IDOT Standard Specifications for Road and Bridge Construction*, adopted by the Illinois Department of Transportation, January 1st, 2022.

Rubino has reported topsoil thicknesses at each boring based on visual observation of surficial soils. Surficial topsoil thickness was visually observed to be between approximately 10 and 16 inches.



SUMMARY OF GEOTECHNICAL CONSIDERATIONS

The main geotechnical design and construction considerations at this site are:

- **Subgrade soils** generally consisted of possible fill (cohesive) underlain by brown and/or gray silty clay and clayey silt. See the Subsurface Conditions and Undocumented Fill Discussion sections for more detailed information.
 - o **High plasticity silty clay** was encountered within the proposed access drive. See the Expansive Soil Discussion for more detailed information.
- **Shallow Foundations** are a possible foundation design option for the proposed receiving station and delivery structure. See the Shallow Foundation Recommendations section for more detailed information.
- **Below Grade Walls** are proposed as part of the new delivery structure. See the Lateral Earth Pressures – Delivery Structure and Geotechnical Considerations for Buried Structures sections for further discussion.
- **Undercuts** should be anticipated to achieve subgrade stability in the new access drive. See the Site Preparation Recommendations section below for further discussion.

EVALUATION AND RECOMMENDATIONS

The geotechnical-related recommendations in this report are presented based on the subsurface conditions encountered and Rubino's understanding of the project. Should changes in the project criteria occur, a review must be made by Rubino to determine if modifications to our recommendations will be necessary.

Site Preparation Recommendations

The following comments are considered site-specific. To reference general subgrade preparation recommendations and compaction recommendations, please refer to the Appendix of this report.

- During construction, the site should be stripped of existing topsoil, concrete, foundations, abandoned utilities, and pavement sections including asphalt, subbase, and curbs if applicable.
- Please note that clay subgrade soils are sensitive to moisture and can be easily disturbed by precipitation, groundwater, or construction equipment. Therefore, extra care should be used to avoid disturbing these soils during construction activities.



Shallow Foundation Recommendations

Design – Soil Bearing Pressure

The proposed receiving station and delivery structure can be supported on shallow, continuous footings and a mat slab foundation, respectively. Rubino recommends that foundations extend through possible fill soils and be supported on the natural, stiff to very stiff silty clay soils or compacted and documented structural fill.

Table 4: Bearing Capacity Recommendations

DESCRIPTION	PROPOSED RECEIVING STATION RECOMMENDATIONS	PROPOSED DELIVERY STRUCTURE RECOMMENDATIONS
Anticipated Foundation Type:	Continuous Footing	Mat Slab
Max Net Allowable Bearing Pressure (psf):	3,000 psf	
Minimum Dimensions:	2 ft.	N/A
Approximate Foundation Design Bearing Elevation:	EL. 626 ft.	EL. 615 ft.
Approximate Elevation of Suitable Bearing Soils:	EL. 626 ft.*	EL. 615 ft.
Boring #'s Referenced:	W-01 through W-03	W-04
Anticipated Bearing Soil Classification:	Brown and gray or gray silty CLAY; $Q_u \geq 1.5$ tsf; DCP blow counts of 5 blows / 6 in.	

*In the event silt is encountered at the proposed bearing elevation (boring W-02), it is recommended that the excavation be extended to the underlying silty clay and widened as described in the Foundation Construction Recommendations and Fill Recommendations in the Appendices.

The net allowable soil bearing pressure is based on dead load plus design live load and represents the pressure that is in excess of the minimum surrounding overburden pressure at the footing base elevation.

Design / Construction – Frost Protection

Exterior footings should be located at a depth of at least 3 ½ feet below the outside final exterior grades to provide adequate frost protection. If the proposed structures are constructed during winter months or if the footings / mat slab will likely be subjected to freezing temperatures after construction is completed, then the footings / mat slab should be protected from freezing.

- **Fine-grained soils such as silts and clays are susceptible to moisture fluctuations and freezing weather**, therefore concrete for the foundations should ideally be poured right after the foundations have been dug and formed if rain is being predicted. Otherwise, foundations that have already been excavated should be protected from rain or surface runoff water.



Design – Settlement Estimate

Based on the known subsurface conditions, laboratory testing, and past experience, Rubino anticipates that properly designed and constructed footings supported on the recommended, observed and documented natural soils, or properly compacted structural fill should experience maximum total settlements of less than 1 inch.

Seismic Site Classification

The 2021 International Building Code (ASCE 7-16) requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). Based on the estimated depth to rock and the estimated shear strength of the soil at the boring locations, Site Class “D” is recommended.

This site class is recommended based on Rubino’s opinion and experience in the area that the consistency of the soils below the depth explored remain consistent or improve in density. Actual determination of soil properties to a depth of 100 feet was beyond the scope of this project.

The SEAOC/OSHPD probabilistic ground motion values near latitude 41.5656° and longitude -88.1384° are shown in the table to the right.

Design Code Reference Document		ASCE7-16
Risk Category		II
Site Class		D - Stiff Soil
Type	Value	Description
S_S	0.138	MCE_R ground motion. (for 0.2 second period)
S_1	0.069	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.221	Site-modified spectral acceleration value
S_{M1}	0.165	Site-modified spectral acceleration value
S_{DS}	0.147	Numeric seismic design value at 0.2 second SA
S_{D1}	0.11	Numeric seismic design value at 1.0 second SA
Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.071	MCE_G peak ground acceleration

Floor Slab Recommendations – Receiving Station

Based on the finished floor elevation of EL. 630 feet for the receiving station provided by the client and the encountered subsurface conditions, the anticipated floor slab will bear on tested and documented brown to gray silty clay or compacted and documented structural fill.

Subgrade soils should be proofrolled and documented by the geotechnical engineer of record prior to placing the floor slab, or inspected and approved newly placed, properly compacted and documented structural fill which extends to original soils as described herein.

Provided that the subgrade consists of native soils (or tested and approved undocumented fill or properly compacted and documented structural fill) as described herein or properly compacted and documented structural fill, a modulus of subgrade reaction, k value, of 120 pounds per cubic inch (psi/inch) may be used in the grade slab design. This value is calculated using empirical correlations based on a 1 ft. x 1 ft. plate load test. However, depending on how the slab load is applied, the value



will have to be geometrically modified as outlined in the Floor slab section of the Slab-on-Grade Considerations Appendix to this report.

Floor slab subgrade preparation should be in accordance with the recommendations outlined in the Site Preparation and Fill Recommendations Appendices of this report.

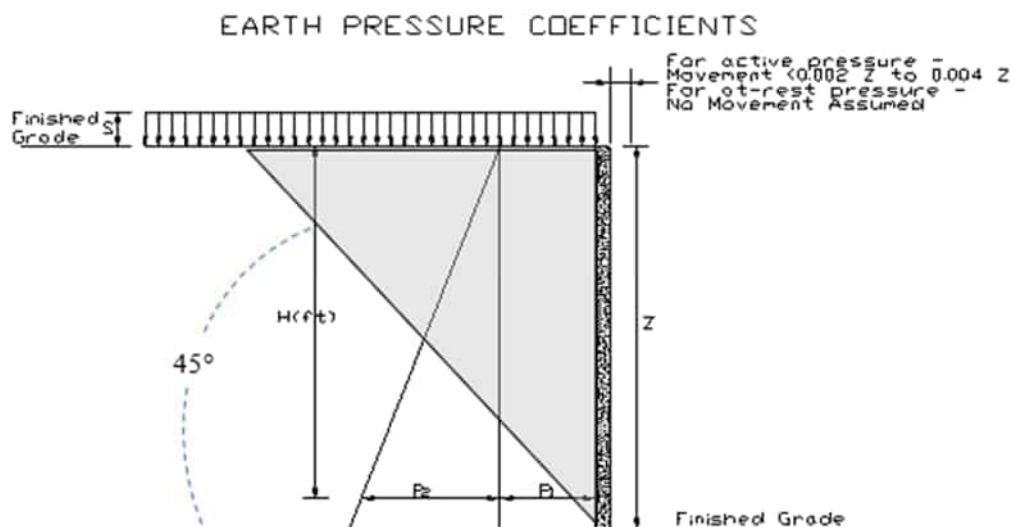
Lateral Earth Pressures – Delivery Structure

Lateral earth pressure is developed from the soils present within a wedge formed by the vertical below-grade wall and an imaginary line extending up and away from the bottom of the wall at an approximate 45° angle. Earth pressures will be influenced by the structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained.

Walls with unbalanced backfill levels on opposite sides, such as below grade walls, should be designed for earth pressures at least equal to those indicated in the following table:

Table 5: Lateral Earth Pressures – Equivalent Fluid Pressure

EARTH PRESSURE CONDITION	K-FACTOR COEFFICIENT FOR BACKFILL TYPE IN SHADED AREA	EQUIVALENT FLUID PRESSURE (PCF)	SURCHARGE PRESSURE P1 (PSF)	EARTH PRESSURE P2 (PSF)
Active (K_a)	Granular – 0.35	44	(0.35)S	(44)H
	Clay – 0.36	45	(0.36)S	(45)H
At-Rest (K_o)	Granular – 0.51	64	(0.51)S	(64)H
	Clay – 0.53	67	(0.53)S	(67)H
Passive (K_p)	Granular – 2.9	363	-	-
	Clay – 2.8	350	-	-



Equivalent Fluid Pressure

The values presented above were calculated based on positive foundation drainage is provided to prevent the buildup of hydrostatic pressure. Please refer to the following bullet points as they pertain to equivalent fluid pressure.

- An “equivalent fluid” pressure can be obtained from the above chart by multiplying the appropriate K-factor times the total unit weight of the stone fill. This applies to unsaturated conditions only.
- If a saturated “equivalent fluid” pressure is needed, the effective unit weight (total unit weight minus unit weight of water) should be multiplied times the appropriate K-factor and the unit weight of water added to that resultant.
- In specific design cases where water is allowed to build up on the below-grade wall structure, the hydrostatic load correlating to the maximum height of the water build up should be added to the lateral loads acting on the wall.

The following equations were used to calculate the earth pressure coefficients “k”.

At-Rest:	$k_o = 1 - \sin\phi$	If the walls are rigidly attached to the structure and not free to rotate or deflect at the top such as shallow tunnels
Active:	$k_a = \tan^2(45 - \frac{\phi}{2})$	Walls that are permitted to rotate and deflect at the top
Passive:	$k_p = \tan^2(45 + \frac{\phi}{2})$	Passive pressure should be determined using a factor of safety of 2.0

Conditions applicable to the above coefficients include:

- For active earth pressure, wall must rotate about base, with top lateral movements 0.002Z to 0.004Z, where Z is the wall height
- For passive earth pressure, wall must move horizontally to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 125 pcf for lean clay and granular soils
- Horizontal backfill, compacted to at least 95% of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No groundwater acting on wall
- No safety factor included
- Ignore passive pressure in the frost depth zone
- The minimum factor of safety for overturning and sliding analysis is 1.5

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For granular values to be valid, the granular backfill must extend out from base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

To calculate the resistance to sliding, a coefficient of friction of 0.35 between the bottom of the mat slab and the native silty clay may be utilized.



Geotechnical Considerations for Buried Structures

A new delivery structure is being proposed for this site. The bottom of the proposed mat slab foundation is approximately at EL. 615 feet. There are three primary considerations with the structural aspects for soils effects on underground structures:

- Installation below the water table will require the dewatering of the excavation to allow installation of the new below grade structure.
- In an empty state, a below grade structure has the uplift force potential of 62.4 pounds per cubic foot for every cubic foot of structure installed below the water table.
- Lateral loads should be balanced during the installation of an underground structure.

An empty structure installed below the water table has the potential for uplift loads. The resistance to uplift is typically supplied by the effective weight of the soil immediately above the structure or immediately above associated tie down structures. Soil above the structure or associated tie down structure that is below the water table will only contribute its buoyant or effective unit weight in resisting the uplift load.

The lateral loads on the below grade structures should be designed to handle unbalanced loads and construction loads. To minimize unbalanced loadings, the below grade walls should be installed in a manner that places the backfill in uniform lifts around the entire structure so that the lateral loads are equal at each level during construction and operation. The structure should be designed for lateral loads consistent with the total depth below the surface. Care should be taken to account for sloping surfaces, point loads and surcharge loads that are applied disproportionately as that will apply unbalanced lateral loads to the structure. Care should be taken during the installation processes that the lateral and construction loads do not deflect the below grade structure to a point that threatens the integrity of the structure.

Dewatering Recommendations

The installation of a new structure below the water table will likely require the dewatering of the excavation to facilitate the installation of the unit. The water table at this site is anticipated to be approximately at EL. 619 – 615 feet and the bottom of the mat slab for the proposed delivery structure is anticipated to be approximately at EL. 615 feet; therefore, dewatering will be likely be required.

Shoring or trench boxes will be required where the soils are granular, saturated, or have low shear strengths. Please reference the anticipated groundwater levels on the attached boring logs and in the Groundwater Conditions section of this report.

Recommendations for Additional Testing

Once the structural loads, site plan and grading plans are finalized, please notify Rubino so that we can review our recommendations for the direct use of the receiving station, delivery structure and



development of the site. Changes in locations of the new structures, foundation depth, and structural loading can affect the geotechnical recommendations for this site.

During construction, Rubino recommends that one of our representatives be onsite for typical **observations and documentation** of exposed subgrade for trench excavation, support of floor slabs and foundations, including proofrolling and penetrometer testing.

CLOSING

The recommendations submitted are based on the available subsurface information obtained by Rubino Engineering, Inc. and design details furnished by Strand Associates, Inc. for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Rubino should be notified immediately to determine if changes in the foundation recommendations are required. If Rubino is not retained to perform these functions, we will not be responsible for the impact of those conditions on the project.

The scope of services did not include an environmental assessment to determine the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air on, below, or around this site. Any statements in this report and/or on the boring logs regarding odors, colors, and/or unusual or suspicious items or conditions are strictly for informational purposes.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Strand Associates, Inc. and their consultants for the specific application to the proposed Receiving Station and Delivery Structure in Crest Hill, Illinois.



Appendix A – Drilling, Field, and Laboratory Test Procedures

ASTM D1586 Penetration Tests and Split-Barrel Sampling of Soils

During the sampling procedure, Standard Penetration Tests (SPT's) were performed at regular intervals to obtain the standard penetration (N-value) of the soil. The results of the standard penetration test are used to estimate the relative strength and compressibility of the soil profile components through empirical correlations to the soils' relative density and consistency. The split-barrel sampler obtains a soil sample for classification purposes and laboratory testing, as appropriate for the type of soil obtained.

Water Level Measurements

Water level observations were attempted during and upon completion of the drilling operation using a 100-foot tape measure. The depths of observed water levels in the boreholes are noted on the boring logs presented in the appendix of this report. In the borings where water is unable to be observed during the field activities, in relatively impervious soils, the accurate determination of the groundwater elevation may not be possible even after several days of observation. Seasonal variations, temperature and recent rainfall conditions may influence the levels of the groundwater table and volumes of water will depend on the permeability of the soils.

Ground Surface Elevations

The approximate ground surface elevations at the boring locations were provided by the client. The depths indicated on the attached boring logs are relative to the existing ground surface for each individual boring at the time of the exploration. Copies of the boring logs are located in the Appendix of this report.

ASTM D2216 Water (Moisture) Content of Soil by Mass (Laboratory)

The water content is an important index property used in expressing the phase relationship of solids, water, and air in a given volume of material and can be used to correlate soil behavior with its index properties. In fine grained cohesive soils, the behavior of a given soil type often depends on its natural water content. The water content of a cohesive soil along with its liquid and plastic limits as determined by Atterberg Limit testing are used to express the soil's relative consistency or liquidity index.

ASTM D4318 Atterberg Limits (Laboratory)

Atterberg limit testing defines the liquid limit (LL) and plastic limit (PL) states of a given soil. These limits are used to determine the moisture content limits where the soil characteristics change from behaving more like a fluid on the liquid limit end to where the soil behaves more like individual soil particles on the plastic limit end. The liquid limit is often used to determine if a soil is a low or high plasticity soil. The plasticity index (PI) is the difference between the liquid limit and the plastic limit. The plasticity index is used in conjunction with the liquid limit to determine if the material will behave like a silt or clay.

Appendix B – Site Preparation

Rubino recommends that unsuitable soils or fill be removed from the site, as applicable. Unsuitable soils or fills can be described as, but are not limited to:

- organic soil / topsoil / plants / trees / shrubs / grass
- frozen soil
- existing asphalt or concrete pavement sections
- existing foundations
- building debris
- existing curbs

Stripping operations should extend a minimum of: **10** feet beyond proposed building limits and **5** feet beyond proposed pavement limits

Exceptions: where property limits allow. Notify geotechnical engineer if there are property boundary limitations. Stripping operations should be monitored and documented by a representative of the geotechnical engineer at the time of construction.

Proofrolling:

After stripping and excavating to the proposed subgrade level, as required, the floor slab and access drive areas should be proof-rolled and scarified and compacted to at least 95 percent of the standard Proctor maximum dry density ASTM D 698 for a depth of at least 8 inches below the surface during a period of dry weather.

Proofrolling Equipment:

Tandem-axle dump truck or similar rubber-tired vehicles are acceptable and should be loaded with at least 9 tons per axle.

Benefits of Proofrolling:

- Aids in providing a firm base for compaction of fill soils
- Helps to delineate soft, loose, or disturbed areas that may exist below subgrade level.

Subgrade Stability:

Soils which are observed to rut or deflect excessively (typically greater than 1 inch) under the moving load should either be scarified and re-compacted, or undercut and replaced.

Subgrade soils may be **stabilized** by one of the following **options**:

- **Scarifying and re-compacting** the existing subgrade soil to at least 95% compaction per ASTM D698 Standard Proctor (12-inch depth).
- **Remove and replace** with non-woven filter fabric and 3-inch stone capped with CA-06 stone.
 - o A layer of non-woven filter geotextile should be placed between silty clay soil and an open-graded stone.
 - o The contractor can also attempt to stabilize the existing subgrade in place by “losing” 3-inch stone into the subgrade until the voids of the 3-inch stone are filled with the soft soil and the subgrade “locks up,” showing minimal deflection under a proofroll.
- **Geogrid and a stone mat** per manufacturer’s installation specifications could reduce the amount of stone required and provide additional lateral support for foundation loads in service.
- **Lime or other chemical additive** stabilization (12 to 14 inches). This can be done as part of a lift structure. Compaction requirements still apply.

Appendix C – Fill Recommendations

In general, fill materials should meet the following:

- Standard Proctor maximum dry density >100 pcf
- Free of organic or other deleterious materials
- Have a maximum particle size no greater than 3 inches
- Have a liquid limit <45 and plasticity index <25
- Testing should include areas at least 5 feet outside the parking area perimeters, if applicable
- Each lift of compacted, engineered fill should be tested and documented by a representative of the geotechnical engineer prior to placement of subsequent lifts
- If a fine-grained silt or clay soil is used for fill (CL or ML), close moisture content control will be essential to achieve the recommended degree of compaction
- If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying

Suitable Soil Classifications:

CL, SC, GW, and SW will generally be suitable for use as structural fill under pavements.

Unsuitable Soil Classifications:

OL, OH, MH, ML, SM, CH and PT should be considered unsuitable.

Structural fill added to the site shall be evaluated in accordance with the following table:

MATERIAL TESTED	PROCTOR TYPE ^{*-1}	MIN % DRY DENSITY	PLACEMENT MOISTURE CONTENT RANGE	FREQUENCY OF TESTING ^{*-2}	MAXIMUM LOOSE LIFT HEIGHT
Structural Fill (Cohesive & Well-graded Granular)	Standard	98%	-2 to +3 %	1 per 2,500 yd ² of fill placed	8 inches
Random Fill (non-load bearing)	Standard	95%	-3 to +3 %	1 per 5,000 yd ² of fill placed	8 inches
Utility Trench Backfill	Standard	95%	-2 to +2 %	1 per 200 LF of fill placed	4 – 6 inches

^{*-1} The test frequency for the laboratory reference shall be one laboratory Proctor or Relative Density test for each material used on the site. If the borrow or source of fill material changes, a new reference moisture/density test should be performed.

^{*-2}A minimum of one test per lift is recommended unless otherwise specified.

Tested fill materials that do not achieve either the required dry density or moisture content range shall be recorded, the location noted, and reported to the Contractor and Owner. A re-test of that area should be performed after the Contractor performs remedial measures. The above test frequencies should be discussed with the contractor prior to starting the work.

The geotechnical engineer of record can only certify work that was performed under their direct observation, or under the observation of a competent person under their specific direction.

Appendix D – Foundation Construction Recommendations

Rubino recommends that soils at the bottom of the footing design elevation be observed, documented, and tested by a representative of Rubino prior to concrete placement to evaluate the consistency of the soils in the field with the geotechnical report findings. The remedial procedures described in the following paragraph can be used to provide suitable foundation support where unsuitable material such as soft or loose soils, existing fill, or organic soils are encountered.

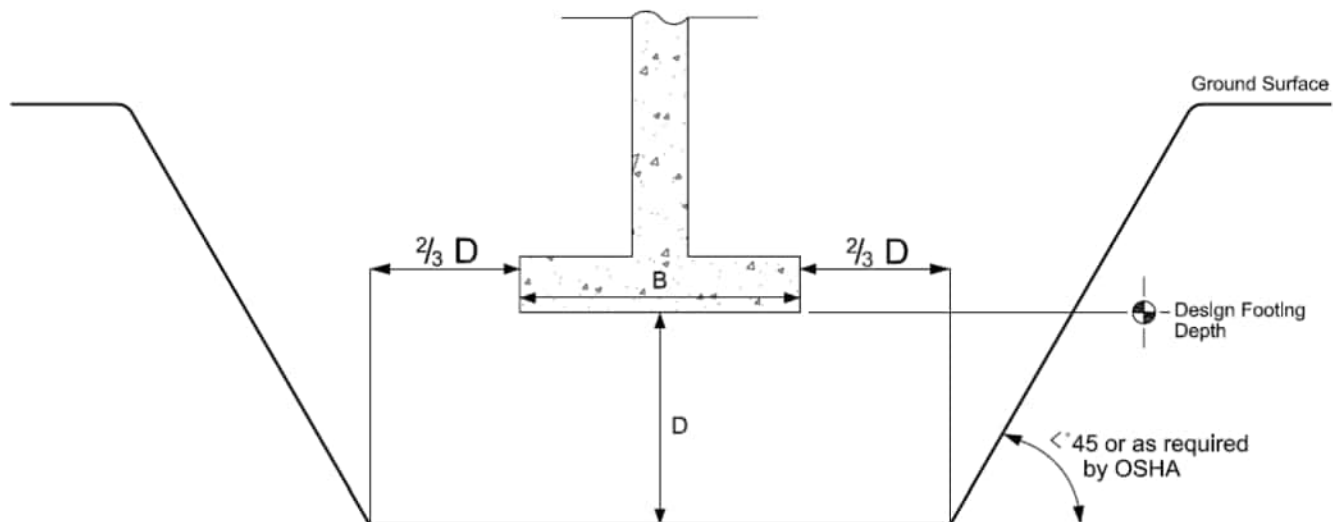
After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface runoff water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, the soils in the excavation should be protected to reduce evaporation or entry of moisture.

If unsuitable bearing soils are encountered in a footing excavation, the footing should be deepened to competent bearing soil and the footing could be lowered, or an over excavation and backfill procedure could be performed. If an over excavation and backfill procedure will be utilized, it would require widening the deepened excavation in all directions at least 8 inches beyond the edges of the footing for each 12 inches of over excavation depth (See "Over Excavation and Backfill Procedure" diagram below).

The over excavation should then be backfilled in a maximum of 8-inches thick loose lifts with suitable granular fill material, such as $\frac{3}{4}$ -inch stone with fines (CA-6), compacted to at least 98% of the maximum Standard Proctor dry density (ASTM D 698).

Another alternative is to undercut and refill the unsuitable area with flowable mortar up to the design elevation of the footings. The flowable mortar would serve as a protection to the subgrade during construction of the foundations. In this case, widening the footings is not necessary.

Over Excavation and Backfill Procedure



* Drawing not to scale

Appendix E – Slab-on-Grade Considerations

The subgrade modulus provided in the main report should be adjusted for larger areas of loading using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction, $k_s = \left(\frac{k}{B} \right)$ for cohesive soil and

$$k_s = k \left(\frac{B+1}{2B} \right)^2 \text{ for cohesionless soil}$$

where: k_s = coefficient of vertical subgrade reaction for loaded area,
 k = coefficient of vertical subgrade reaction for 1x1 square foot area, and
 B = width of area loaded, in feet

The precautions listed below should be followed for construction of slab-on-grade pads.

- Cracking of slab-on-grade concrete is normal and should be expected.
- Cracking can occur not only as a result of heaving or compression of the supporting soil and/or fill material, but also as a result of concrete curing stresses.
- The occurrence of concrete shrinkage cracks and problems associated with concrete curing may be reduced and/or controlled by:
 - o Limiting the slump of the concrete
 - o Proper concrete placement, finishing, and curing
 - o The placement of crack control joints at frequent intervals, particularly where re-entrance slab corners occur.
 - The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions.
- The floor slab should be independent of the foundation walls.
- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas.
- Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.
- Rubino recommends that a minimum 4-inch thick, free-draining granular mat be placed beneath the floor slab to enhance drainage. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage. Floor slabs should not be rigidly connected to columns, walls, or foundations.
- A vapor retarder should be considered in areas of tile, carpet, or other moisture sensitive floor finishes. Appropriate curing procedures should be followed to reduce the risk of slab “curling” if a vapor retarder is used.

These details will not reduce the amount of movement but are intended to reduce potential damage should some settlement of the supporting subgrade take place. Some increase in moisture content in the floor slab is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

Appendix F – Report Limitations

Subsurface Conditions:

The subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data as well as water level information. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition between layers may be gradual. The samples, which were not altered by laboratory testing, will be retained for up to 60 days from the date of this report and then will be discarded.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools that geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free, and more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations, presented in the preceding section, constitute Rubino's professional estimate of the necessary measures for the proposed structure to perform according to the proposed design based on the information generated and reference during this evaluation, and Rubino's experience in working with these conditions.

Warranty:

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Federal Excavation Regulations:

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. This federal regulation mandates that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Rubino is providing this information solely as a service to our client. Rubino is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

Appendix G – Soil Classification General Notes

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon - 1 3/8" I.D., 2" O.D., unless otherwise noted
 ST: Thin-Walled Tube - 3" O.D., Unless otherwise noted
 PM: Pressuremeter
 RB: Rock Bit
 DB: Diamond Bit - 4", N, B

PS: Piston Sample
 WS: Wash Sample
 HA: Hand Auger
 HS: Hollow Stem Auger
 BS: Bulk Sample

Standard "N" Penetration: Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split spoon sampler (SS), except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of ground water levels is not possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION:

Soil Classification is based on the Unified Soil Classification System as defined in ASTM D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine-grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength, Qu (tsf)	N-Blows/ft.	Consistency
< 0.25	< 2	Very Soft
0.25 - 0.5	2 - 4	Soft
0.5 - 1	4 - 8	Medium Stiff
1 - 2	8 - 15	Stiff
2 - 4	15 - 30	Very Stiff
4 - 8	30 - 50	Hard
> 8	> 50	Very Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

N-Blows/ft.	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense
80+	Extremely Dense

RELATIVE PROPORTIONS OF SAND & GRAVEL

Descriptive Term	% of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. To 3 in. (300mm to 75mm)
Gravel	3 in. To #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.75mm)

*Descriptive Terms apply to components also present in sample

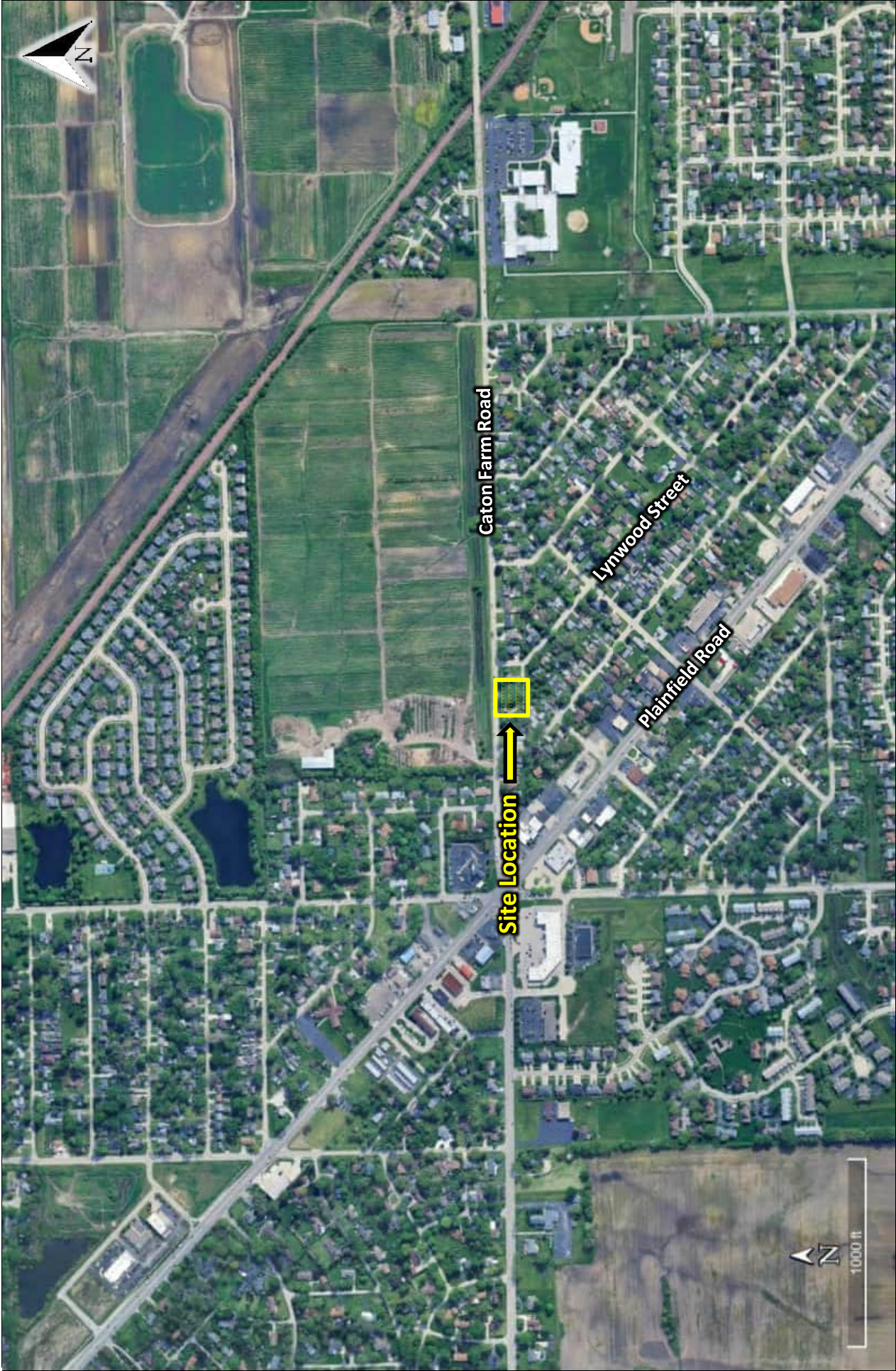
Appendix H – Soil Classification Chart

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

Appendix I – Site Vicinity Map & Boring Location Plan

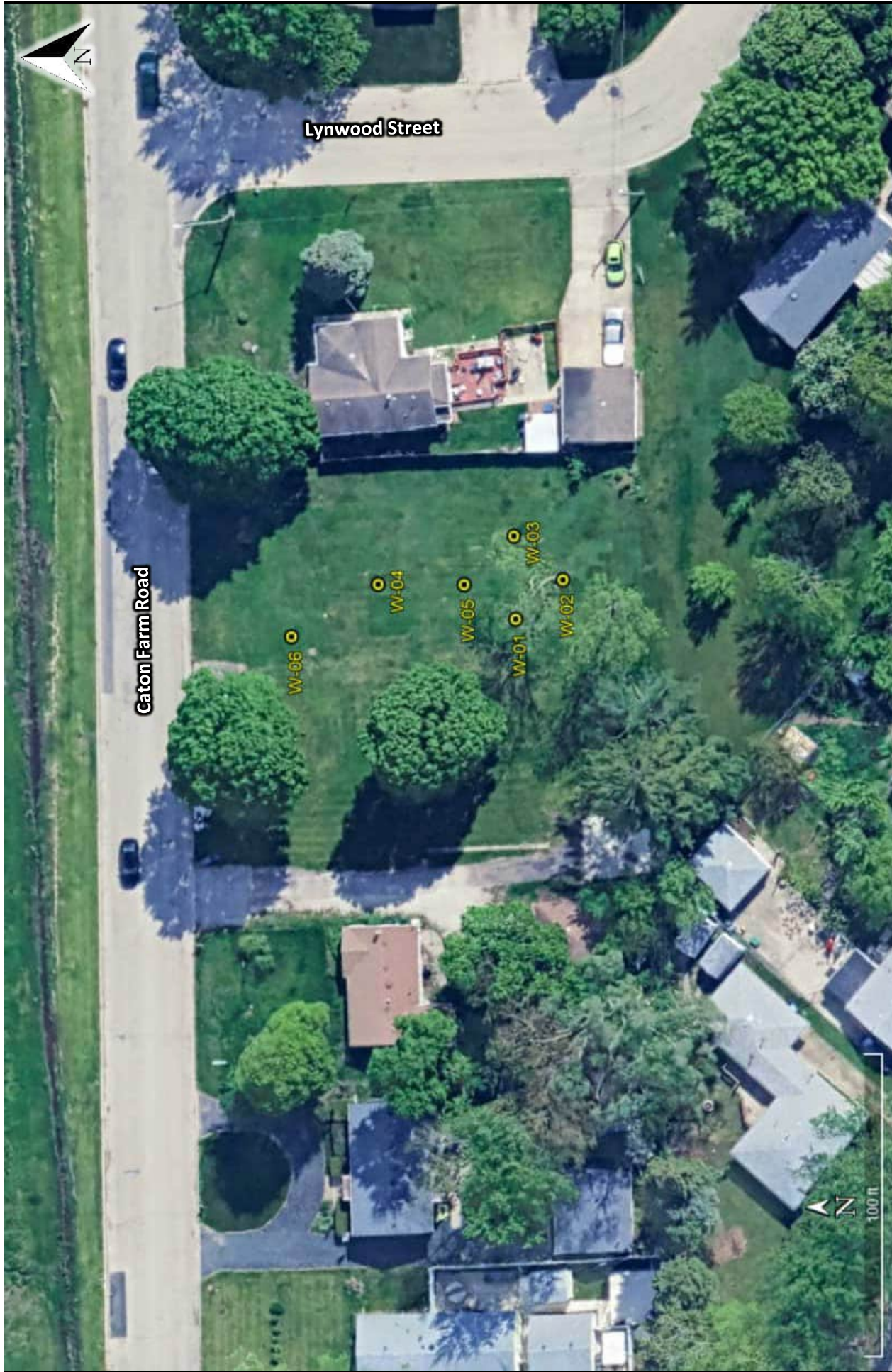


Site Vicinity Map

Western Receiving Station
2305-2309 Caton Farm Road
Crest Hill, Illinois
Strand Associates, Inc.
G24.156

Project Name:
Project Location:
Client:
Rubino Project # :

rubino
ENGINEERING INC.
425 Shepard Drive
Elgin, Illinois 60123

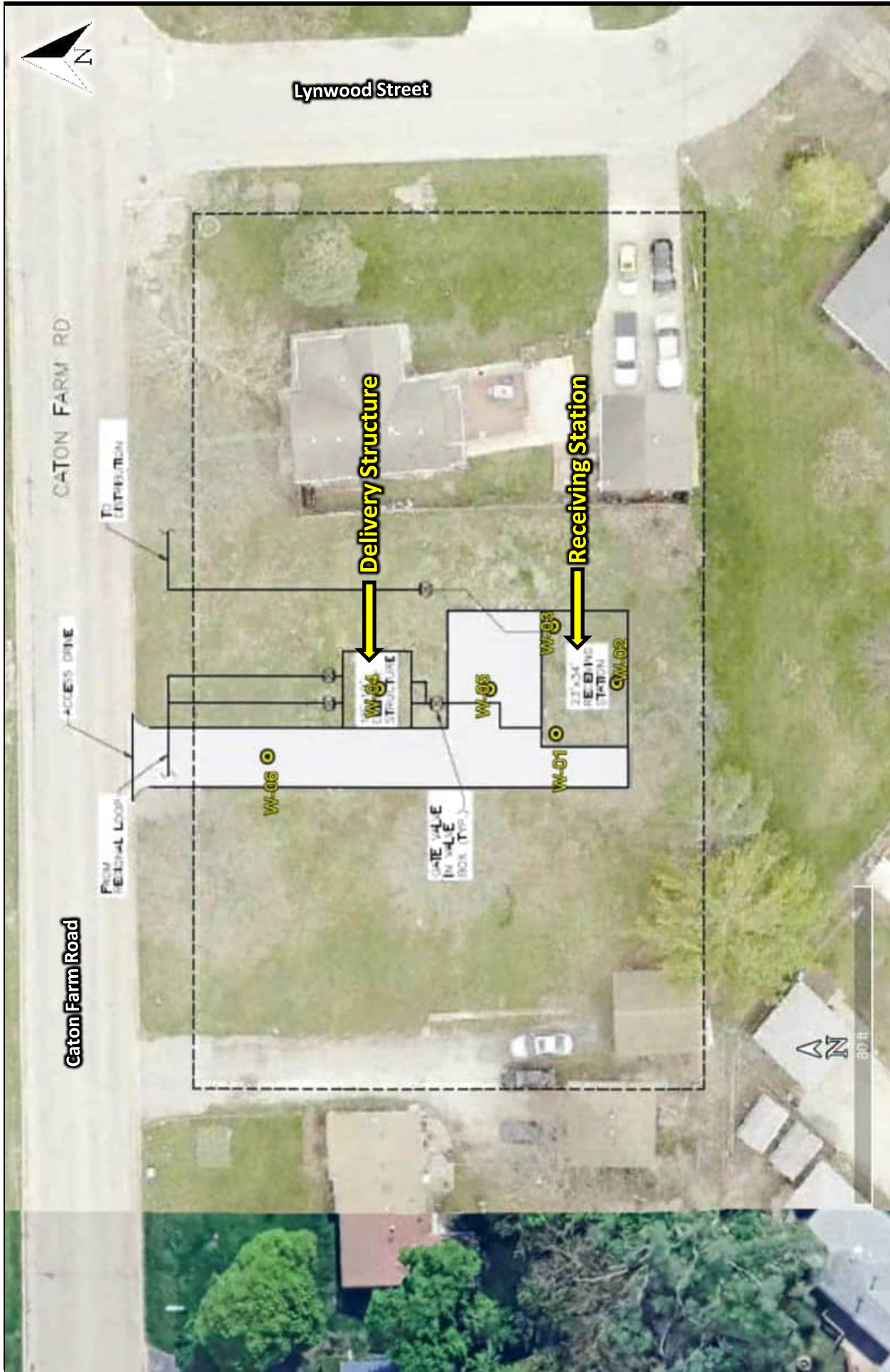


rubino
ENGINEERING INC.
425 Shepard Drive
Elgin, Illinois 60123

Project Name:
Project Location:
Client:
Rubino Project # :

Western Receiving Station
2305-2309 Caton Farm Road
Crest Hill, Illinois
Strand Associates, Inc.
G24.156

**Boring
Location
Plan
1 of 2**



rubino
ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:
Project Location:
Client:
Rubino Project # :

Western Receiving Station
2305-2309 Caton Farm Road
Crest Hill, Illinois
Strand Associates, Inc.
G24.156

**Boring
Location
Plan
2 of 2**

Appendix J – Borings Logs

LOG OF BORING W-01

Sheet 1 of 1

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Receiving Station	▼ Delay N/A
Client: Strand Associates, Inc.		

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
							Surface Elev.: 628.2 ft				◎ Moisture ✕ PL ▲ Qu (Rimac) ✱ Qp/Qr 0 25 50 0 2.0 4.0	
625	0			1	8		Approximately 10 inches of TOPSOIL: dark brown and black silty clay, with roots		5-6-7 N=13	12		Qp=4.5 tsf
	5			2	18		Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel		5-7-10 N=17	15		Qp=4.5 tsf
620				3	18				4-6-8 N=14	17		Qp=4.5 tsf
	10			4	16				4-4-9 N=13	19		Qp=4.5 tsf
	15			5	16				4-7-8 N=15	17		Qp=4.3 tsf
615				6	18		Color transitions to gray at approximately 13½ feet BEG	CL	3-6-8 N=14	17		Qp=3.0 tsf
	20			7	14				2-4-5 N=9	19		Qp=2.3 tsf
605				8	18				4-4-7 N=11	20		Qp=2.5 tsf
	25						End of boring at approximately 25 feet below existing grade.					

Completion Depth: 25.0 ft	Sample Types:	Latitude: 41.565543
Date Boring Started: 11/12/24	Auger Cutting	Longitude: -88.138447
Date Boring Completed: 11/12/24	Split-Spoon	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Rock Core	Remarks:
Drilling Contractor: Rubino Engineering, Inc.		Log Entry: J. Ignarski
		Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.

***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

LOG OF BORING W-02

Sheet 1 of 1

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Receiving Station	▼ Delay N/A
Client: Strand Associates, Inc.		

Elevation (feet)	Depth (feet)	Graphic Log	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
						Surface Elev.: 628.3 ft				◎ Moisture × PL + LL ▲ Qu (Rimac) *Qp/Qr	
625	0		1	18		Approximately 16 inches of TOPSOIL: dark brown and black silty clay, with roots	CL	4-5-6 N=11	21	×	Qp=2.5 tsf
625	5		2	18		Stiff, brown and gray silty CLAY, trace sand and gravel	ML	3-3-5 N=8	19	×	Qp=2.5 tsf
620	10		3	18		Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel		4-6-8 N=14	17	×	Qp=4.5 tsf
620	15		4	18				3-5-8 N=13	17	×	Qp=4.0 tsf
615	20		5	0		No recovery. Soils classified from auger cuttings.		7-8-9 N=17	17	×	
615	25		6	18		Color transitions to gray at approximately 13½ feet BEG	CL	3-5-8 N=13	17	×	Qp=4.5 tsf
610	20		7	18				4-5-8 N=13	22	×	Qp=1.5 tsf
605	25		8	18				3-4-5 N=9	20	×	Qp=2.0 tsf
						End of boring at approximately 25 feet below existing grade.					

Completion Depth: 25.0 ft	Sample Types:	Pressuremeter	Latitude: 41.565500
Date Boring Started: 11/12/24	Auger Cutting	Shelby Tube	Longitude: -88.138401
Date Boring Completed: 11/12/24	Split-Spoon	Grab Sample	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Rock Core	No Recovery	Remarks:
Drilling Contractor: Rubino Engineering, Inc.			Log Entry: J. Ignarski
			Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.

***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

LOG OF BORING W-03

Sheet 1 of 1

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Receiving Station	▼ Delay N/A
Client: Strand Associates, Inc.		

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
							Surface Elev.: 628.3 ft				◎ Moisture × PL + LL STRENGTH, tsf ▲ Qu (Rimac) *Qp/Qr	
625	0			1	6		Approximately 16 inches of TOPSOIL: dark brown and black silty clay, with roots		3-5-7 N=12	20	×	Qp=4.5 tsf
620	5			2	12		Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel		3-4-8 N=12	17	×	Qp=4.5 tsf
615	10			3	18				3-5-7 N=12	18	×	Qp=4.5 tsf
610	15			4	18				3-5-7 N=12	18	×	Qp=4.5 tsf
605	20			5	18				3-4-8 N=12	19	×	Qp=4.5 tsf
	25			6	18		Color transitions to gray at approximately 13½ feet BEG	CL	4-6-8 N=14	17	×	Qp=4.5 tsf
				7	18				4-7-8 N=15	18	×	
				8	18		Medium stiff, gray silty CLAY, trace sand and gravel	CL	3-3-4 N=7	22	×	Qp=2.0 tsf
							End of boring at approximately 25 feet below existing grade.					

Completion Depth: 25.0 ft	Sample Types:	Latitude: 41.565545
Date Boring Started: 11/12/24	Auger Cutting	Longitude: -88.138349
Date Boring Completed: 11/12/24	Split-Spoon	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Rock Core	Remarks:
Drilling Contractor: Rubino Engineering, Inc.		Log Entry: J. Ignarski
		Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

LOG OF BORING W-04

Sheet 1 of 1

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Delivery Structure	▼ Delay N/A
Client: Strand Associates, Inc.		

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
							Surface Elev.: 628.5 ft				◎ X Moisture PL LL STRENGTH, tsf ▲ Qu (Rimac) *Qp/Qr	
625	0			1	4		Approximately 14 inches of TOPSOIL: dark brown and black silty clay, with roots	CL	3-4-5 N=9	13		
625	5			2	8		Black, dark brown and dark gray silty CLAY, trace sand and gravel <i>Possible Fill</i>	CL	3-5-9 N=14	7		Qp=4.5 tsf
620	10			3	16		Stiff, brown sandy silty CLAY, with gravel		3-5-7 N=12	20		Qp=4.5 tsf
620	15			4	18		Stiff, brown and gray silty CLAY, trace sand and gravel		3-4-8 N=12	15		Qp=4.5 tsf
615	20			5	18		<i>Color transitions to gray at approximately 9½ feet BEG</i>		3-5-6 N=11	16		Qp=4.0 tsf
615	25			6	16				3-5-7 N=12	18		Qp=3.5 tsf
610	30			7	18			CL	3-3-6 N=9	23		Qp=3.3 tsf
605	35			8	18				3-4-7 N=11	15		Qp=3.0 tsf
600	40			9	18				3-5-7 N=12	21		Qp=3.0 tsf
	30						End of boring at approximately 30 feet below existing grade.					

Completion Depth: 30.0 ft	Sample Types:	Latitude: 41.565668
Date Boring Started: 11/11/24	Auger Cutting	Longitude: -88.138406
Date Boring Completed: 11/11/24	Split-Spoon	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Rock Core	Remarks:
Drilling Contractor: Rubino Engineering, Inc.		Log Entry: J. Ignarski
		Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.

***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

LOG OF BORING W-05

Sheet 1 of 1

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Access Drive	▼ Delay N/A
Client: Strand Associates, Inc.		

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
							Surface Elev.: 628.7 ft				◎ Moisture × PL + LL STRENGTH, tsf ▲ Qu (Rimac) *Qp/Qr	
625	0			1	0		Approximately 14 inches of TOPSOIL: dark brown and black silty clay, with roots		3-4-5 N=9	20	×	
625	5			2	18		Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel	CL	3-4-5 N=9	19	×	Qp=4.5 tsf
620				3	12				4-5-10 N=15			Qp=4.5 tsf
620	10			4	18				5-6-10 N=16	16	×	Qp=4.5 tsf
							End of boring at approximately 30 feet below existing grade.					

Completion Depth: 10.0 ft	Sample Types:	Latitude: 41.565590
Date Boring Started: 11/12/24	Pressuremeter	Longitude: -88.138406
Date Boring Completed: 11/12/24	Shelby Tube	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Grab Sample	Remarks:
Drilling Contractor: Rubino Engineering, Inc.	No Recovery	Log Entry: J. Ignarski
		Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Job No.: G24.156A	Drilling Method: 2 ¼ Hollow Stem Auger	WATER LEVELS***
Project: Western Receiving Station	Sampling Method: Split Spoon	▽ While Drilling N/A
Location: 2305 - 2309 Caton Farm Road	Hammer Type: Automatic	▼ Upon Completion N/A
City, State: Crest Hill, Illinois	Boring Location: Western Site - Access Drive	▼ Delay N/A
Client: Strand Associates, Inc.		

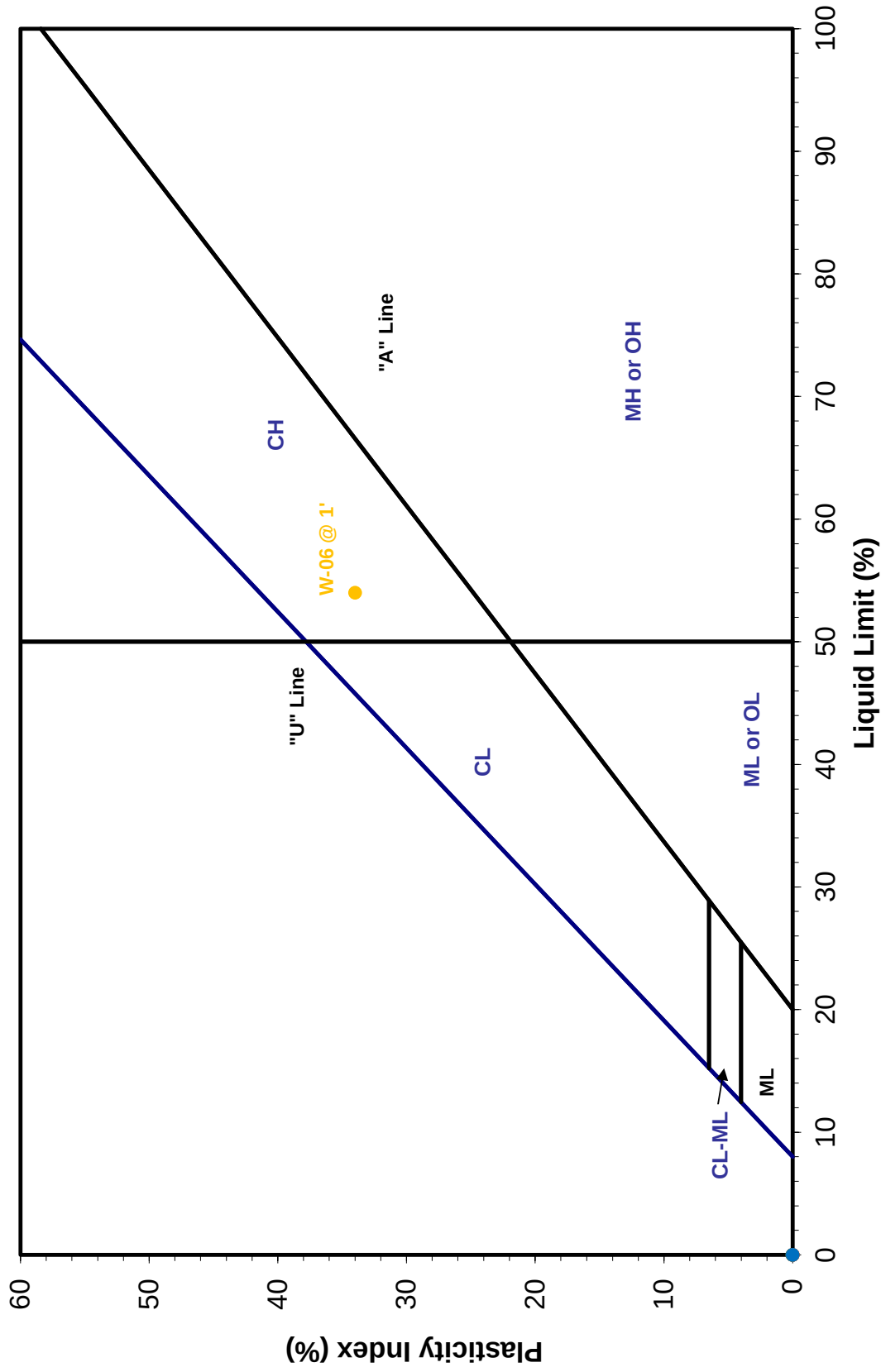
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA	Additional Remarks
							Surface Elev.: 628.3 ft				◎ X Moisture PL LL STRENGTH, tsf ▲ Qu (Rimac) *Qp/Qr	
625	0			1	12		Approximately 14 inches of TOPSOIL: dark brown and black silty clay, with roots	CH	4-6-5 N=11	19		LL = 54 PL = 20
625	5			2	18		Dark gray and black HIGH PLASTICITY SILTY CLAY, trace sand and gravel		4-3-6 N=9	18		Qp=4.5 tsf
620	5			3	18		Possible Fill					
620	5			3	18		Stiff, brown and gray silty CLAY, trace sand and gravel	CL	4-5-8 N=13	15		Qp=4.5 tsf
620	10			4	16				3-6-8 N=14	17		Qp=4.3 tsf
							End of boring at approximately 10 feet below existing grade.					

Completion Depth: 10.0 ft	Sample Types:	Latitude: 41.565748
Date Boring Started: 11/11/24	Pressuremeter	Longitude: -88.138468
Date Boring Completed: 11/11/24	Shelby Tube	Drill Rig: Geoprobe 7822DT
Logged By: J.K.	Grab Sample	Remarks:
Drilling Contractor: Rubino Engineering, Inc.	No Recovery	Log Entry: J. Ignarski
		Checked By: D. Lewandowski, P.E.

The stratification lines represent approximate boundaries. The transition may be gradual.

***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Appendix K – Laboratory Results



Boring #	W-06 @ 1'						Project: Western Receiving Station
LL	54						Location: Crest Hill, Illinois
PL	20						Client: Strand Associated, Inc.
PI	34						Project #: G24,156



REPORT TRANSMITTAL

March 18, 2025

To: Richard Scheer, P.E.
Strand Associates, Inc.®
1170 South Houbolt Road
Joliet, Illinois 60431

Re: **Geotechnical Engineering Services Report**
Eastern Receiving Site
Caton Farm Road and Oakland Avenue
Crest Hill, Illinois

Rubino Report No. G24.156B_REV1

Via email: richard.scheer@strand.com; nathan.wisnionski@strand.com

Dear Mr. Scheer,

Rubino Engineering, Inc. is pleased to submit our Geotechnical Engineering Services Report for the proposed water storage tank, receiving and pump station and delivery structure at the Eastern Site in Crest Hill, Illinois.

Report Description

Enclosed is the Geotechnical Engineering Services Report including results of field and laboratory testing, as well as recommendations for foundation design and general site development.

Authorization and Correspondence History

- Rubino Proposal No. Q23.257g_REV1 dated November 21, 2023; Agreement For Professional Services signed and authorized by Joseph M. Bunker, Corporate Secretary of Strand Associates, Inc.® on September 10, 2024.
- Email from Richard Scheer of Strand Associates, Inc. on January 22, 2025, stating that the designer has revised the dimensions of the tank and that the designer requests additional information (design groundwater depth and PVR). *Revisions to report are in italics.*

Closing

Rubino appreciates the opportunity to provide geotechnical services for this project and we look forward to continued participation during the design and in future construction phases of this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully submitted,
RUBINO ENGINEERING, INC.

Michelle A. Lipinski, PE
President

michelle.lipinski@rubinoeng.com

MAL/file/ Enclosures

**EASTERN RECEIVING SITE
CATON FARM ROAD AND OAKLAND
AVENUE**

CREST HILL, ILLINOIS

**RUBINO PROJECT No.
G24.156B_REV1**

Geotechnical Engineering Services Report

*Drilling
Laboratory Testing
Geotechnical Analysis*

**PREPARED BY:
DAVID T. LEWANDOWSKI, P.E.**

**REVIEWED BY:
MATTHEW KURZ, EI**

rubino
ENGINEERING INC.

**Michelle A. Lipinski, PE
President
IL No. 062-061241, Exp. 11/30/2025**

PREPARED FOR:

**STRAND ASSOCIATES, INC.
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS**

MARCH 18, 2025

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PROJECT INFORMATION

Rubino Engineering, Inc. (Rubino) understands that Strand Associates, Inc.® (Strand) is planning the addition of a new water storage tank, receiving and pump station and delivery structure at the Eastern Site (Parcel # 11-04-32-200-023-0004) in Crest Hill, Illinois. The proposed structures are as follows:

Receiving and Pump Station:

- Plan dimensions 58-ft. by 39-ft.
- Slab-on-grade construction.
- Finished floor: EL. 635 ft.
- Site grading includes fills of approximately 2 feet to achieve finished floor elevation.
- Frost wall foundations, masonry walls and a precast concrete plank roof.
- Maximum wall loads of approximately 2.9 klf vertical and 34.6 psf lateral (unfactored service loads).
- Floor Slab: 100 psf live load.

Delivery Structure:

- Plan dimensions 22-ft.-4 in. by 18-ft.-9 in.
- Cast-in-place below grade structure.
- Mat slab foundation.
- Mat thickness 1 ft.-8 in.
- Proposed bottom of mat approximately at EL. 623.3 ft. (approximately 12 feet below existing grade)
- Total unfactored weight on mat slab: 315,252 lbs.
 - Total Dead Weight: 294,000 Pounds.
 - Total Water Storage Weight: 21,252 Pounds.

Driveways and Access Roads:

- Site grading including cuts and fills being less than 2 feet.
- PCC pavement.

Documents received:

- "1-ASM1.01", Receiving and Pumping Station Floor Plans, Figure 26, prepared by Strand, received on May 15, 2023
- "Delivery Sites for Geot Tech 11x17_Optimized" – Proposed Primary Delivery Point, Figure 24, prepared by Strand, received on May 15, 2023
- "G24.156B Eastern Site_Boring Coordinates" – boring elevations included in document received on December 6, 2024
- "05-CM1.01", Eastern Receiving Site: Yard Piping Plan, Sheet 05-CM1.01, prepared by Strand, received on December 12, 2024



- “Geotechnical Evaluation Overview - AWWA D110 and ACI 372R”, Geotechnical Checklist and Criteria Needed For Tank Design, prepared by DN Tanks (tank manufacturer), received on December 12, 2024
- “Crest Hill, IL Anticipated Tank Loadings”, prepared by DN Tanks (tank manufacturer) and supplied by Strand on January 22, 2025, via email.

Project Correspondence:

- RFP Email from Nathan Wisnionski of Strand dated May 15, 2023.
- Email from Richard Scheer, P.E. of Strand dated September 28, 2023 – project description
 - Authorization to proceed via Agreement signed by Joseph M. Bunker of Strand on September 10, 2024.
- Email from Richard Scheer, P.E. of Strand dated December 6, 2024 – boring elevations.
- Emails from Richard Scheer, P.E. of Strand dated December 12, 2024 – grading, final elevations, structural loads, plan dimensions of proposed structures and description of mat foundation.
- *Email from Richard Scheer, P.E. of Strand dated January 22, 2025 – DN Tanks has revised the proposed tank dimensions and requested the design groundwater elevation and PVR.*

The geotechnical recommendations presented in this report are based on the available project information and the subsurface materials described in this report. If any of the information on which this report is based is incorrect, please inform Rubino in writing so that we may amend the recommendations presented in this report (if appropriate, and if desired by the client). Rubino will not be responsible for the implementation of our recommendations if we are not notified of changes in the project.

Purpose / Scope of Services

The purpose of this study was to explore the subsurface conditions at the site in order to prepare geotechnical recommendations for foundation design and general site development for the proposed construction. Rubino’s scope of services included the following drilling program:

Table 1: Drilling Scope

BORING NUMBERS	DEPTH (FEET BEG*)	LOCATION
E-01 – E-04	25	Receiving and Pump Station
E-05	59 ½ **	Center of Water Storage Tank
E-06 – E-08	35	Perimeter of Water Storage Tank
E-09	30	Delivery Structure
E-10 – E-11	10	Access Drive

*BEG = below existing grade

**Upon reaching auger and spoon refusal, rock coring was performed to a final depth of approximately 59 ½ feet below existing grade

Representative soil samples obtained during the field exploration program were transported to the laboratory for additional classification and laboratory testing.

This report briefly outlines the following:



- Summary of client-provided project information and report basis
- Overview of encountered subsurface conditions
- Overview of field and laboratory tests performed including results
- Geotechnical recommendations pertaining to:
 - Subgrade preparation and cut / fill recommendations
 - Shallow foundations, including suitable foundation type(s), allowable bearing pressure(s), and estimated settlement
 - Seismic design site classification parameters
- Construction considerations, including temporary excavation and construction control of water

DRILLING, FIELD, AND LABORATORY TEST PROCEDURES

In consultation with Strand, Rubino selected the number of borings and the boring depths. Rubino located the borings in the field by measuring distances from known fixed site features with the aid of a handheld GPS instrument. The borings were advanced utilizing 2 ¼ inch inside-diameter, hollow stem auger drilling methods and soil samples were routinely obtained during the drilling process.

Selected soil samples were tested in the laboratory to determine material properties for this report. Drilling, sampling, and laboratory tests were accomplished in general accordance with ASTM procedures. The following items are further described in the Appendix of this report.

- Field Penetration Tests and Split-Barrel Sampling of Soils (ASTM D1586)
- Field Water Level Measurements
- Laboratory Determination of Water (Moisture) Content of Soil by Mass (ASTM D2216)
- Laboratory Determination of Atterberg Limits (ASTM D4318)

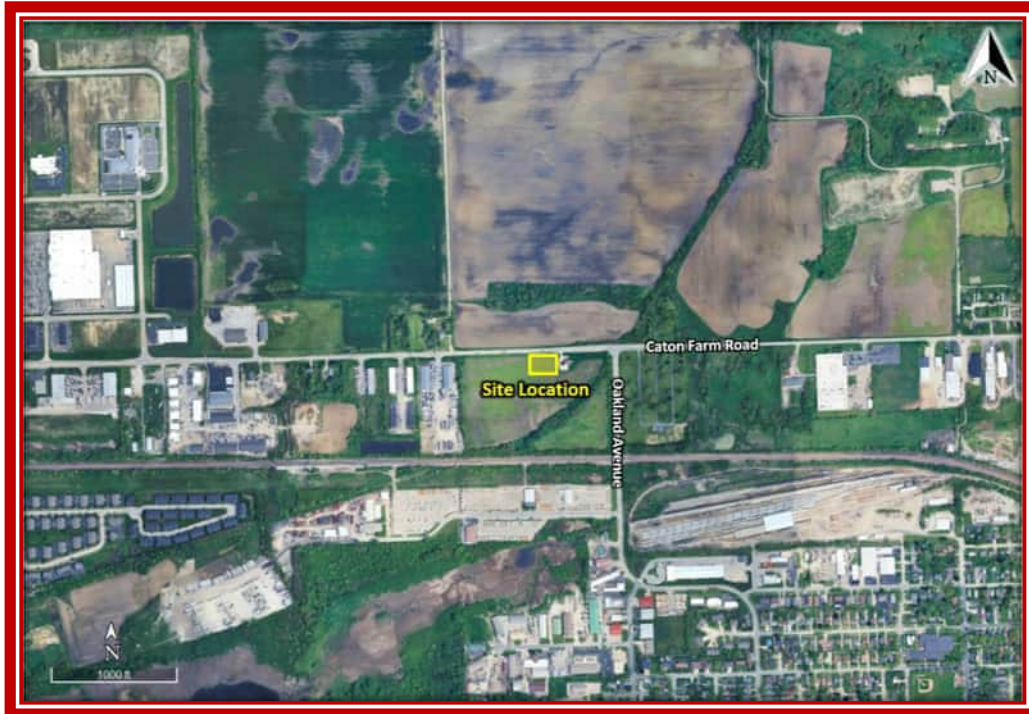
The laboratory testing program was conducted in general accordance with applicable ASTM specifications. The results of these tests are to be found on the accompanying boring logs located in the Appendix.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The project site is currently undeveloped and covered with grass. The terrain is gradual and generally slopes down to the south. The elevations at the borings ranged from approximately EL. 635 feet to EL. 627 feet. There is an existing building, Well 10 WTP, located immediately east of the project site.





The midpoint of the project site has an approximate latitude and longitude of 41.5663° and -88.1046°, respectively.

SUMMARY OF GEOTECHNICAL CONSIDERATIONS

The main geotechnical design and construction considerations at this site are:

- **Subgrade soils** generally consisted of brown and/or gray silty clay, interbedded brown sand and brown and gray clayey silt underlain by limestone bedrock. See the Subsurface Conditions section for more detailed information.
 - **High plasticity silty clay soils** were encountered in the upper soil profile. See the Subsurface Conditions and Expansive Soils Discussion sections for more detailed information.
- **Shallow Foundations** are a possible foundation design option for the proposed water storage tank, receiving and pump station and delivery structure. See the Shallow Foundation Recommendations section for more detailed information.
- **Below Grade Walls** are proposed as part of the lower level of the delivery structure. See the Lateral Earth Pressures – Delivery Structure and Geotechnical Considerations for Buried Structures sections for further discussion.
- **Undercuts** should be anticipated to achieve subgrade stability in the new access drive and beneath the floor slab of the new receiving and pump station. See the Expansive Soils Discussion and Site Preparation Recommendations section below for further discussion.



Subsurface Conditions

Beneath the existing surficial topsoil, subsurface conditions generally consisted of brown and/or gray silty clay with interbedded brown sand and brown and gray clayey silt underlain by limestone bedrock.

- The **topsoil** thickness ranged between approximately 8 and 14 inches
- The native **silty clay** and **clayey silt** soils were generally stiff to hard in consistency
 - Very hard **clayey silt** was encountered just above the bedrock
- The **granular** soils were generally medium dense in apparent density
- **Limestone bedrock** was encountered in the deepest boring

Table 2: Subsurface Conditions Summary

APPROXIMATE ELEVATION RANGE (FEET)	SOIL DESCRIPTION	SPT N- VALUES (BLOWS PER FOOT)	MOISTURE CONTENT (%)	ESTIMATED SHEAR STRENGTH
RECEIVING AND PUMP STATION (E-01 – E-04)				
633 - 608	Stiff to very stiff, brown and gray / gray silty CLAY, trace sand and gravel	8 - 24	14 - 23	$c \cong 1,200 - 3,600$ psf
633 - 630	Brown and gray HIGH PLASTICITY SILTY CLAY, trace sand and gravel (E-03)	12	24	---
STORAGE TANK (E-05 – E-08)				
632 – 593 ½	Stiff to very stiff, brown and gray / gray silty CLAY, trace sand and gravel	8 - 23	15 - 25	$c \cong 1,200 - 3,450$ psf
603 – 598 ½	Medium dense, gray well-graded SAND, trace gravel (E-06)	23	6	$\phi \cong 33 - 34^\circ$
599 - 587	Stiff to very stiff, gray clayey SILT, trace sand and gravel	13 - 16	11 - 23	$c \cong 1,050 - 1,300$ psf
594 - 592	Hard, gray clayey SILT, trace sand and gravel (E-06)	37	17	$c \cong 2,200 - 2,600$ psf
586 ½ - 584	Very hard, gray clayey SILT, with gravel and rock chips (E-05)	50+	11	$c \cong 4,000 - 5,000$ psf
584 - 571	Light gray LIMESTONE bedrock RQD 52% - 68% (E-05)	---	---	---



APPROXIMATE ELEVATION RANGE (FEET)	SOIL DESCRIPTION	SPT N- VALUES (BLOWS PER FOOT)	MOISTURE CONTENT (%)	ESTIMATED SHEAR STRENGTH
DELIVERY STRUCTURE (E-09)				
634 - 605	Stiff to very stiff, brown and gray / gray silty CLAY, trace sand and gravel	9 - 22	16 - 21	$c \cong 1,350 - 3,300$ psf
ACCESS DRIVE (E-10 – E-11)				
633 – 630 ½	Brown and gray HIGH PLASTICITY SILTY CLAY, trace sand and gravel (E-10)	15	20	---
633 - 624	Stiff to very stiff, brown and gray / gray silty CLAY, trace sand and gravel	8 - 20	16 - 21	$c \cong 1,200 - 3,000$ psf

The native soils were visually classified as silty clay (CL), clayey silt (CL-ML) and well-graded sand (SW) according to the Unified Soil Classification System (USCS). The above table is a general summary of subsurface conditions. Please refer to the boring logs for more detailed information.

Estimated shear strength of clay soils is based on empirical correlations using N-values, moisture content, and unconfined compressive strength, as applicable.

Groundwater Conditions

Groundwater was not observed in the borings during the drilling operation due to the low permeability of the encountered soils. Based on the color change of the soils from brown to gray, Rubino estimates that groundwater may be approximately in the range of EL. 625 feet to EL. 619 feet (approximately 8 ½ to 13 ½ feet below the existing ground surface).

It should be noted that fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. Groundwater may not have been observed in some areas due to the low permeability of soils. Additionally, discontinuous zones of perched water may exist within the soils. The possibility of groundwater level fluctuation should be considered when developing the design and construction plans for the project.

When bidding this project, the contractor should anticipate that groundwater will be present during excavation.

Expansive Soil Discussion

Soils with low to moderate expansive properties were observed in borings E-03 and E-10 to elevations ranging approximately from EL. 633 to EL. 630 feet (approximately 1 to 3 ½ feet below



existing grade) during the drilling operations. There is a possibility that expansive soils could be encountered at other locations on the site.

Table 3: Expansive Soils by Location

BORING NUMBER / LOCATION	SOIL DESCRIPTION	APPROXIMATE ELEVATION / DEPTH RANGE (FEET / FEET BEG*)	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)
E-03 / Receiving and Pump Station	Brown and gray HIGH PLASTICITY SILTY CLAY	633 – 630 / 1 – 3 ½	58	23
E-10 / Access Drive	Brown and gray HIGH PLASTICITY SILTY CLAY	633 – 630 ½ / 1 – 3 ½	55	23

*BEG = below existing grade

Expansive soils are considered unsuitable for construction due to their tendency to absorb moisture from the ground or atmosphere which causes swelling and, in turn, an increase in volume. Soils with Liquid Limits greater than 50% (LL > 50%) may exhibit highly plastic behavior and may be considered to have expansive properties (*IDOT Standard Specifications, 2022*).

Expansive soils have high frost susceptibility and may have higher moisture contents which could contribute to failed proof rolls, however expansive soils are difficult to visually delineate in the field during construction.

Where expansive soils are encountered, Rubino recommends that the high plasticity soils be undercut a minimum of 12 inches. Please see the [Site Preparation Recommendations](#) section below for further discussion.

Topsoil Discussion

Topsoil materials as described in this report have not been analyzed for quality according to any minimum specifications. If topsoil is to be imported to or exported from this site, Rubino recommends that it meet the minimum specifications defined in **Section 1081.05** of the *IDOT Standard Specifications for Road and Bridge Construction*, adopted by the Illinois Department of Transportation, January 1st, 2022.

Rubino has reported topsoil thicknesses at each boring based on visual observation of surficial soils. Surficial topsoil thickness was visually observed to be between approximately 8 and 14 inches.



EVALUATION AND RECOMMENDATIONS

The geotechnical-related recommendations in this report are presented based on the subsurface conditions encountered and Rubino's understanding of the project. Should changes in the project criteria occur, a review must be made by Rubino to determine if modifications to our recommendations will be necessary.

Site Preparation Recommendations

The following comments are considered site-specific. To reference general subgrade preparation recommendations and compaction recommendations, please refer to the Appendix of this report.

- During construction, the site should be stripped of existing concrete, foundations, abandoned utilities, and pavement sections including asphalt, subbase, and curbs if applicable.
- Please note that clay subgrade soils are sensitive to moisture and can be easily disturbed by precipitation, groundwater, or construction equipment. Therefore, extra care should be used to avoid disturbing these soils during construction activities.
- High plasticity silty clay was encountered in boring E-03 within the proposed receiving and pump station and boring E-10 within the proposed access drive. It is recommended that the high plasticity soils be undercut a minimum 12 inches below the floor subbase (receiving and pump station) and final subgrade elevation (access drive) and replaced with structural fill.

Shallow Foundation Recommendations

Design – Soil Bearing Pressure

The proposed structures can be supported on shallow, spread footing, continuous footing, mat or ring wall foundations, as specified below. Rubino recommends that foundations extend through soils of inadequate shear strength and be supported on the stiff to very stiff silty clay soils or compacted and documented structural fill.

Table 4: Bearing Capacity Recommendations

DESCRIPTION	PROPOSED RECEIVING AND PUMP STATION RECOMMENDATIONS	PROPOSED WATER STORAGE TANK RECOMMENDATIONS	PROPOSED DELIVERY STRUCTURE RECOMMENDATIONS
Anticipated Foundation Type:	Continuous footing	Mat Slab	Mat Slab



DESCRIPTION	PROPOSED RECEIVING AND PUMP STATION RECOMMENDATIONS	PROPOSED WATER STORAGE TANK RECOMMENDATIONS	PROPOSED DELIVERY STRUCTURE RECOMMENDATIONS
Anticipated / Recommended Min. Foundation Bearing Depth / Elevation:	Recommended minimum of 4 feet below final exterior grade	Recommended minimum of 4 feet below final exterior grade and bearing on at least 2 feet of CA-06 Stone	Anticipated: EL. 623.33 ft.
Max. Net Allowable Bearing Pressure (psf):	4,000 psf	See <u>Settlement Estimates</u> section below	3,000 psf
Minimum Dimensions:	2 ft.	N/A	N/A
Recommended Bearing Soil Classification:	Brown and/or gray silty CLAY; $Q_u \geq 2.0$ tsf. DCP blow counts of 7 blows per 6 in.		Brown and gray silty CLAY; $Q_u \geq 1.5$ tsf. DCP blow counts of 5 blows per 6 in.
Estimated Primary Settlement:	≤ 1 inch total $\leq \frac{3}{4}$ inch differential*	See <u>Estimated Settlements</u> below	≤ 1 inch total
Boring #'s Referenced:	E-01 – E-04	E-05 – E-08	E-09

*Differential settlement between Borings E-01 through E-04.

The net allowable soil bearing pressure is based on dead load plus design live load and represents the pressure that is in excess of the minimum surrounding overburden pressure at the footing base elevation.

Design – Settlement Estimates

Based on the known subsurface conditions, laboratory testing, calculations and past experience, Rubino anticipates that properly designed and constructed foundation systems supported on the recommended, observed and documented natural soils, or properly compacted structural fill should experience maximum total settlements as listed above in Table 4 (Pump Station and Delivery Structure) and as follows (Water Storage Tank):

Table 5: Estimated Settlements – Storage Tank

FOUNDATION DIMENSIONS (MAT SLAB WITH THICKENED EXTERIOR FOOTING)	MAXIMUM NET ALLOWABLE BEARING PRESSURE AT BOTTOM OF FOUNDATION (EL. 629 FT.)	TOTAL ESTIMATED SETTLEMENT OF BEARING SOILS**	TOTAL ESTIMATED DIFFERENTIAL SETTLEMENT BETWEEN BORINGS E-05 THROUGH E-08
90'-8"	3,500 – 4,000 psf*	$\cong 2 \frac{1}{2} - 3 \frac{1}{2}$ in	≤ 1 in.

*Bearing at frost depth on 2 feet of compacted CA-06 stone

**Settlement should be monitored consistently by a licensed surveyor during and after construction. The frequency of monitoring should be at least weekly during construction and



monthly post construction.

If the magnitude of the estimated settlements is intolerable for the proposed structure, an intermediate foundation system may be considered for this site. Possible alternatives may include rammed aggregate piers or controlled modulus columns. These systems can improve the foundation bearing soils, limit the amount of settlement and facilitate a shallow foundation system. The design and construction of an intermediate foundation system should be performed by the specialty contractor. Rubino can provide contact information upon request.

Design / Construction – Frost Protection

Based upon visual classification and laboratory testing, the foundation bearing soils (silty clay) are highly frost susceptible per the U.S. Army Corps of Engineers (reference the IDOT Geotechnical Manual (2020) Table 6.3.2.2.3-1). As a result, footings should be located at a depth of at least 3 ½ feet below the outside final exterior grades to provide adequate frost protection. If the proposed structures are constructed during winter months or if the footings / mat slab will likely be subjected to freezing temperatures after construction is completed, then the footings / mat slab should be protected from freezing.

Floor Slab Recommendations – Receiving and Pump Station

Based on the finished floor elevation of EL. 635 feet provided by the client and the encountered subsurface conditions, the anticipated floor slab will bear on tested and approved natural brown and gray silty clay or compacted and documented structural fill.

Subgrade soils should be proofrolled and documented by the geotechnical engineer of record prior to placing the floor slab, or inspected and approved newly placed, properly compacted and documented structural fill which extends to original soils as described herein.

- Rubino recommends that high plasticity silty clay soils (boring E-03) be undercut a minimum 12 inches below final subgrade elevation and replaced with structural fill.

Provided that the subgrade consists of native soils as described herein or properly compacted and documented structural fill, a modulus of subgrade reaction, k value, of 125 pounds per cubic inch (psi/inch) may be used in the grade slab design. This value is calculated using empirical correlations based on a 1 ft. x 1 ft. plate load test. However, depending on how the slab load is applied, the value will have to be geometrically modified as outlined in the Floor slab section of the Slab-on-Grade Considerations Appendix to this report.

Floor slab subgrade preparation should be in accordance with the recommendations outlined in the Site Preparation and Fill Recommendations Appendices of this report.

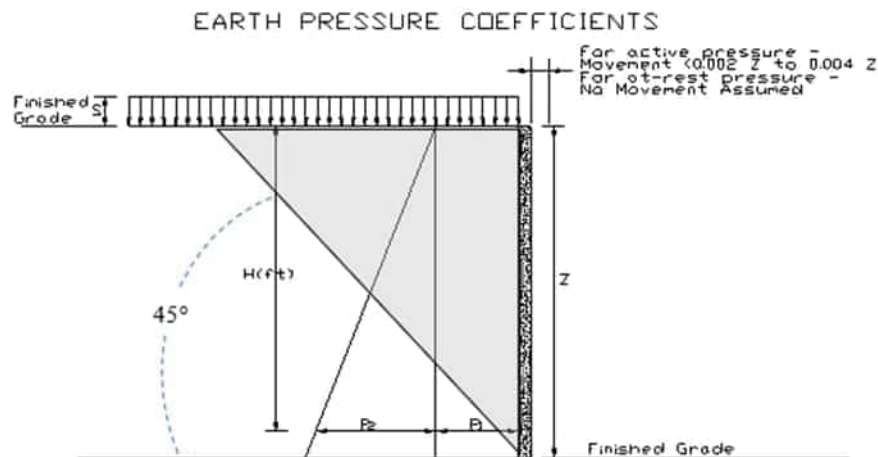


The 2021 International Building Code (ASCE 7-16) requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). Based on the estimated depth to rock and the estimated shear strength of the soil at the boring locations, Site Class “D” is recommended.

The SEAOC/OSHPD probabilistic ground motion values near latitude 41.5663° and longitude -88.1046° are shown in the table to the right.

Design Code Reference Document	ASCE7-16	
Risk Category	II	
Site Class	D - Stiff Soil	
Type	Value	Description
S _S	0.137	MCE _R ground motion. (for 0.2 second period)
S ₁	0.069	MCE _R ground motion. (for 1.0s period)
S _{MS}	0.22	Site-modified spectral acceleration value
S _{M1}	0.165	Site-modified spectral acceleration value
S _{DS}	0.147	Numeric seismic design value at 0.2 second SA
S _{DT}	0.11	Numeric seismic design value at 1.0 second SA
Type	Value	Description
SDC	B	Seismic design category
F _a	1.6	Site amplification factor at 0.2 second
F _v	2.4	Site amplification factor at 1.0 second
PGA	0.07	MCE _G peak ground acceleration

Lateral earth pressure is developed from the soils present within a wedge formed by the vertical below-grade wall and an imaginary line extending up and away from the bottom of the wall at an approximate 45° angle. Earth pressures will be influenced by the structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained.



Rubino Engineering, Inc.

Table 6: Lateral Earth Pressures – Equivalent Fluid Pressure

EARTH PRESSURE CONDITION	K-FACTOR COEFFICIENT FOR BACKFILL TYPE IN SHADED AREA	EQUIVALENT FLUID PRESSURE (PCF)	SURCHARGE PRESSURE P1 (PSF)	EARTH PRESSURE P2 (PSF)
Active (K_a)	Granular – 0.35	44	(0.35)S	(44)H
	Clay – 0.36	45	(0.36)S	(45)H
At-Rest (K_o)	Granular – 0.51	64	(0.51)S	(64)H
	Clay – 0.53	67	(0.53)S	(67)H
Passive (K_p)	Granular – 2.9	363	-	-
	Clay – 2.8	350	-	-

Equivalent Fluid Pressure

The values presented above were calculated based on positive foundation drainage is provided to prevent the buildup of hydrostatic pressure. Please refer to the following bullet points as they pertain to equivalent fluid pressure.

- An “equivalent fluid” pressure can be obtained from the above chart by multiplying the appropriate K-factor times the total unit weight of the stone fill. This applies to unsaturated conditions only.
- If a saturated “equivalent fluid” pressure is needed, the effective unit weight (total unit weight minus unit weight of water) should be multiplied times the appropriate K-factor and the unit weight of water added to that resultant.
- In specific design cases where water is allowed to build up on the below-grade wall structure, the hydrostatic load correlating to the maximum height of the water build up should be added to the lateral loads acting on the wall.

The following equations were used to calculate the earth pressure coefficients “k”.

At-Rest:	$k_o = 1 - \sin\phi$	If the walls are rigidly attached to the structure and not free to rotate or deflect at the top such as shallow tunnels
Active:	$k_a = \tan^2(45 - \frac{\phi}{2})$	Walls that are permitted to rotate and deflect at the top
Passive:	$k_p = \tan^2(45 + \frac{\phi}{2})$	Passive pressure should be determined using a factor of safety of 2.0

Conditions applicable to the above coefficients include:

- For active earth pressure, wall must rotate about base, with top lateral movements 0.002Z to 0.004Z, where Z is the wall height
- For passive earth pressure, wall must move horizontally to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 125 pcf for lean clay and granular soils



- Horizontal backfill, compacted to at least 95% of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No groundwater acting on wall
- No safety factor included
- Ignore passive pressure in the frost depth zone
- The minimum factor of safety for overturning and sliding analysis is 1.5

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For granular values to be valid, the granular backfill must extend out from base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

To calculate the resistance to sliding, a coefficient of friction of 0.35 between the bottom of the mat slab and the native silty clay may be utilized.

Geotechnical Considerations for Buried Structures

A new delivery structure is proposed for this site. The bottom of the proposed mat slab foundation is approximately at EL. 623.3 feet. The long-term groundwater elevation is estimated at or near this elevation. There are three primary considerations with the structural aspects for soils effects on underground structures:

- Installation below the water table will require the dewatering of the excavation to allow installation of the new below grade structure.
- In an empty state, a below grade structure has the uplift force potential of 62.4 pounds per cubic foot for every cubic foot of structure installed below the water table.
- Lateral loads should be balanced during the installation of an underground structure.

An empty structure installed below the water table has the potential for uplift loads. The resistance to uplift is typically supplied by the effective weight of the soil immediately above the structure or immediately above associated tie down structures. Soil above the structure or associated tie down structure that is below the water table will only contribute its buoyant or effective unit weight in resisting the uplift load.

The lateral loads on the below grade structures should be designed to handle unbalanced loads and construction loads. To minimize unbalanced loadings, the below grade walls should be installed in a manner that places the backfill in uniform lifts around the entire structure so that the lateral loads are equal at each level during construction and operation. The structure should be designed for lateral loads consistent with the total depth below the surface. Care should be taken to account for sloping surfaces, point loads and surcharge loads that are applied disproportionately as that will apply unbalanced lateral loads to the structure. Care should be taken during the installation processes that the lateral and construction loads do not deflect the below grade structure to a point that threatens the integrity of the structure.



Dewatering Recommendations

Dewatering may be necessary during excavation of soils due to the presence of shallow groundwater, precipitation, surficial runoff, and the presence of sand seams or other conditions not apparent at the time of drilling. Shoring or trench boxes may be required where the soils are granular, saturated, or have low shear strengths. Please reference the anticipated groundwater levels on the attached boring logs and in the Groundwater Conditions section of this report.

Recommendations for Additional Testing

Once the structural loads, site plan and grading plans are finalized, please notify Rubino so that we can review our recommendations for the direct use of the receiving station, delivery structure and development of the site. Changes in locations of the new structures, foundation depth, and structural loading can affect the geotechnical recommendations for this site.

During construction, Rubino recommends that one of our representatives be onsite for typical **observations and documentation** of exposed subgrade for trench excavation, support of floor slabs and foundations, including proofrolling and penetrometer testing.

CLOSING

The recommendations submitted are based on the available subsurface information obtained by Rubino Engineering, Inc. and design details furnished by Strand Associates, Inc. for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Rubino should be notified immediately to determine if changes in the foundation recommendations are required. If Rubino is not retained to perform these functions, we will not be responsible for the impact of those conditions on the project.

The scope of services did not include an environmental assessment to determine the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air on, below, or around this site. Any statements in this report and/or on the boring logs regarding odors, colors, and/or unusual or suspicious items or conditions are strictly for informational purposes.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Strand Associates, Inc. and their consultants for the specific application to the proposed water storage tank, receiving and pump station and delivery structure at the Eastern Receiving Site in Crest Hill, Illinois.



Appendix A – Drilling, Field, and Laboratory Test Procedures

ASTM D1586 Penetration Tests and Split-Barrel Sampling of Soils

During the sampling procedure, Standard Penetration Tests (SPT's) were performed at regular intervals to obtain the standard penetration (N-value) of the soil. The results of the standard penetration test are used to estimate the relative strength and compressibility of the soil profile components through empirical correlations to the soils' relative density and consistency. The split-barrel sampler obtains a soil sample for classification purposes and laboratory testing, as appropriate for the type of soil obtained.

Water Level Measurements

Water level observations were attempted during and upon completion of the drilling operation using a 100-foot tape measure. The depths of observed water levels in the boreholes are noted on the boring logs presented in the appendix of this report. In the borings where water is unable to be observed during the field activities, in relatively impervious soils, the accurate determination of the groundwater elevation may not be possible even after several days of observation. Seasonal variations, temperature and recent rainfall conditions may influence the levels of the groundwater table and volumes of water will depend on the permeability of the soils.

Ground Surface Elevations

The approximate ground surface elevations at the boring locations were provided by Strand. The depths indicated on the attached boring logs are relative to the existing ground surface for each individual boring at the time of the exploration. Copies of the boring logs are located in the Appendix of this report.

ASTM D2216 Water (Moisture) Content of Soil by Mass (Laboratory)

The water content is an important index property used in expressing the phase relationship of solids, water, and air in a given volume of material and can be used to correlate soil behavior with its index properties. In fine grained cohesive soils, the behavior of a given soil type often depends on its natural water content. The water content of a cohesive soil along with its liquid and plastic limits as determined by Atterberg Limit testing are used to express the soil's relative consistency or liquidity index.

ASTM D4318 Atterberg Limits (Laboratory)

Atterberg limit testing defines the liquid limit (LL) and plastic limit (PL) states of a given soil. These limits are used to determine the moisture content limits where the soil characteristics change from behaving more like a fluid on the liquid limit end to where the soil behaves more like individual soil particles on the plastic limit end. The liquid limit is often used to determine if a soil is a low or high plasticity soil. The plasticity index (PI) is the difference between the liquid limit and the plastic limit. The plasticity index is used in conjunction with the liquid limit to determine if the material will behave like a silt or clay.

Appendix B – Site Preparation

Rubino recommends that unsuitable soils or fill be removed from the site, as applicable. Unsuitable soils or fills can be described as, but are not limited to:

- organic soil / topsoil / plants / trees / shrubs / grass
- frozen soil
- existing asphalt or concrete pavement sections
- existing foundations
- building debris
- existing curbs

Stripping operations should extend a minimum of: **10 feet** beyond proposed building limits and **5 feet** beyond proposed pavement limits

Exceptions: where property limits allow. Notify geotechnical engineer if there are property boundary limitations. Stripping operations should be monitored and documented by a representative of the geotechnical engineer at the time of construction.

Proofrolling:

After stripping and excavating to the proposed subgrade level, as required, the floor slab (receiving and pump station) and access drive should be proof-rolled and scarified and compacted to at least 95 percent of the standard Proctor maximum dry density ASTM D 698 for a depth of at least 8 inches below the surface during a period of dry weather.

Proofrolling Equipment:

Tandem-axle dump truck or similar rubber-tired vehicles are acceptable and should be loaded with at least 9 tons per axle.

Benefits of Proofrolling:

- Aids in providing a firm base for compaction of fill soils
- Helps to delineate soft, loose, or disturbed areas that may exist below subgrade level.

Subgrade Stability:

Soils which are observed to rut or deflect excessively (typically greater than 1 inch) under the moving load should either be scarified and re-compacted, or undercut and replaced.

Subgrade soils may be **stabilized** by one of the following **options**:

- **Scarifying and re-compacting** the existing subgrade soil to at least 95% compaction per ASTM D698 Standard Proctor (12-inch depth).
- **Remove and replace** with non-woven filter fabric and 3-inch stone capped with CA-06 stone.
 - A layer of non-woven filter geotextile should be placed between silty clay soil and an open-graded stone.
 - The contractor can also attempt to stabilize the existing subgrade in place by “losing” 3-inch stone into the subgrade until the voids of the 3-inch stone are filled with the soft soil and the subgrade “locks up,” showing minimal deflection under a proofroll.
- **Geogrid and a stone mat** per manufacturer’s installation specifications could reduce the amount of stone required and provide additional lateral support for foundation loads in service.
- **Lime or other chemical additive** stabilization (12 to 14 inches). This can be done as part of a lift structure. Compaction requirements still apply.

Appendix C – Fill Recommendations

In general, fill materials should meet the following:

- Standard Proctor maximum dry density >100 pcf
- Free of organic or other deleterious materials
- Have a maximum particle size no greater than 3 inches
- Have a liquid limit <45 and plasticity index <25
- Testing should include areas at least 5 feet outside the parking area perimeters, if applicable
- Each lift of compacted, engineered fill should be tested and documented by a representative of the geotechnical engineer prior to placement of subsequent lifts
- If a fine-grained silt or clay soil is used for fill (CL or ML), close moisture content control will be essential to achieve the recommended degree of compaction
- If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying

Suitable Soil Classifications:

CL, SC, GW, and SW will generally be suitable for use as structural fill under pavements.

Unsuitable Soil Classifications:

OL, OH, MH, ML, SM, CH and PT should be considered unsuitable.

Structural fill added to the site shall be evaluated in accordance with the following table:

MATERIAL TESTED	PROCTOR TYPE ^{*1}	MIN % DRY DENSITY	PLACEMENT MOISTURE CONTENT RANGE	FREQUENCY OF TESTING ^{*2}	MAXIMUM LOOSE LIFT HEIGHT
Structural Fill (Cohesive & Well-graded Granular)	Standard	98%	-2 to +3 %	1 per 2,500 yd ² of fill placed	8 inches
Random Fill (non-load bearing)	Standard	95%	-3 to +3 %	1 per 5,000 yd ² of fill placed	8 inches
Utility Trench Backfill	Standard	95%	-2 to +2 %	1 per 200 LF of fill placed	4 – 6 inches

^{*1} The test frequency for the laboratory reference shall be one laboratory Proctor or Relative Density test for each material used on the site. If the borrow or source of fill material changes, a new reference moisture/density test should be performed.

^{*2}A minimum of one test per lift is recommended unless otherwise specified.

Tested fill materials that do not achieve either the required dry density or moisture content range shall be recorded, the location noted, and reported to the Contractor and Owner. A re-test of that area should be performed after the Contractor performs remedial measures. The above test frequencies should be discussed with the contractor prior to starting the work.

The geotechnical engineer of record can only certify work that was performed under their direct observation, or under the observation of a competent person under their specific direction.

Appendix D – Foundation Construction Recommendations

Rubino recommends that soils at the bottom of the footing design elevation be observed, documented, and tested by a representative of Rubino prior to concrete placement to evaluate the consistency of the soils in the field with the geotechnical report findings. The remedial procedures described in the following paragraph can be used to provide suitable foundation support where unsuitable material such as soft or loose soils, existing fill, or organic soils are encountered.

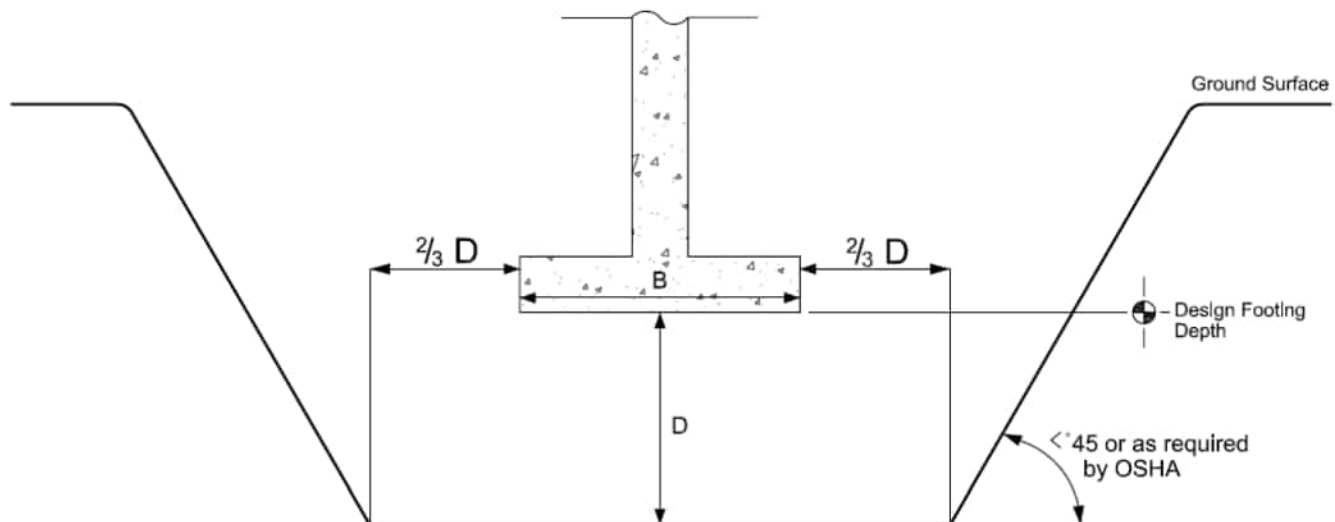
After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface runoff water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, the soils in the excavation should be protected to reduce evaporation or entry of moisture.

If unsuitable bearing soils are encountered in a footing excavation, the footing should be deepened to competent bearing soil and the footing could be lowered, or an over excavation and backfill procedure could be performed. If an over excavation and backfill procedure will be utilized, it would require widening the deepened excavation in all directions at least 8 inches beyond the edges of the footing for each 12 inches of over excavation depth (See "Over Excavation and Backfill Procedure" diagram below).

The over excavation should then be backfilled in a maximum of 8-inches thick loose lifts with suitable granular fill material, such as $\frac{3}{4}$ -inch stone with fines (CA-6), compacted to at least 98% of the maximum Standard Proctor dry density (ASTM D 698).

Another alternative is to undercut and refill the unsuitable area with flowable mortar up to the design elevation of the footings. The flowable mortar would serve as a protection to the subgrade during construction of the foundations. In this case, widening the footings is not necessary.

Over Excavation and Backfill Procedure



* Drawing not to scale

Appendix E – Slab-on-Grade Considerations

The subgrade modulus provided in the main report should be adjusted for larger areas of loading using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction, $k_s = \left(\frac{k}{B} \right)$ for cohesive soil and

$$k_s = k \left(\frac{B+1}{2B} \right)^2 \text{ for cohesionless soil}$$

where: k_s = coefficient of vertical subgrade reaction for loaded area,
 k = coefficient of vertical subgrade reaction for 1x1 square foot area, and
 B = width of area loaded, in feet

The precautions listed below should be followed for construction of slab-on-grade pads.

- Cracking of slab-on-grade concrete is normal and should be expected.
- Cracking can occur not only as a result of heaving or compression of the supporting soil and/or fill material, but also as a result of concrete curing stresses.
- The occurrence of concrete shrinkage cracks and problems associated with concrete curing may be reduced and/or controlled by:
 - Limiting the slump of the concrete
 - Proper concrete placement, finishing, and curing
 - The placement of crack control joints at frequent intervals, particularly where re-entrance slab corners occur.
 - The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions.
- The floor slab should be independent of the foundation walls.
- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas.
- Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.
- Rubino recommends that a minimum 4-inch thick, free-draining granular mat be placed beneath the floor slab to enhance drainage. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage. Floor slabs should not be rigidly connected to columns, walls, or foundations.
- A vapor retarder should be considered in areas of tile, carpet, or other moisture sensitive floor finishes. Appropriate curing procedures should be followed to reduce the risk of slab “curling” if a vapor retarder is used.

These details will not reduce the amount of movement but are intended to reduce potential damage should some settlement of the supporting subgrade take place. Some increase in moisture content in the floor slab is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

Appendix F – Report Limitations

Subsurface Conditions:

The subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data as well as water level information. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition between layers may be gradual. The samples, which were not altered by laboratory testing, will be retained for up to 60 days from the date of this report and then will be discarded.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools that geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free, and more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations, presented in the preceding section, constitute Rubino's professional estimate of the necessary measures for the proposed structure to perform according to the proposed design based on the information generated and reference during this evaluation, and Rubino's experience in working with these conditions.

Warranty:

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Federal Excavation Regulations:

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. This federal regulation mandates that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Rubino is providing this information solely as a service to our client. Rubino is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

Appendix G – Soil Classification General Notes

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon - 1 3/8" I.D., 2" O.D., unless otherwise noted
 ST: Thin-Walled Tube - 3" O.D., Unless otherwise noted
 PM: Pressuremeter
 RB: Rock Bit
 DB: Diamond Bit - 4", N, B

PS: Piston Sample
 WS: Wash Sample
 HA: Hand Auger
 HS: Hollow Stem Auger
 BS: Bulk Sample

Standard "N" Penetration: Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split spoon sampler (SS), except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of ground water levels is not possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION:

Soil Classification is based on the Unified Soil Classification System as defined in ASTM D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine-grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength, Qu (tsf)	N-Blows/ft.	Consistency
< 0.25	< 2	Very Soft
0.25 - 0.5	2 - 4	Soft
0.5 - 1	4 - 8	Medium Stiff
1 - 2	8 - 15	Stiff
2 - 4	15 - 30	Very Stiff
4 - 8	30 - 50	Hard
> 8	> 50	Very Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

N-Blows/ft.	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense
80+	Extremely Dense

RELATIVE PROPORTIONS OF SAND & GRAVEL

Descriptive Term	% of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. To 3 in. (300mm to 75mm)
Gravel	3 in. To #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)

*Descriptive Terms apply to components also present in sample

Appendix H – Soil Classification Chart

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

Appendix I – Site Vicinity Map & Boring Location Plans

Appendix J – Borings Logs

Appendix K – Laboratory Results

APPENDIX

**UNCONTAMINATED SOIL CERTIFICATION
FORM LPC 662**



Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

Source Site Certification by Owner or Operator for Use of Uncontaminated Soil as Fill in a CCDD or Uncontaminated Soil Fill Operation LPC-662

Revised in accordance with 35 Ill. Adm. Code 1100, as
amended by PCB R2012-009 (eff. Aug. 27, 2012)

This certification form is to be used by source site owners and operators to certify, pursuant to 35 Ill. Adm. Code 1100.205(a)(1) (A), that soil (i) was removed from a site that is not potentially impacted property and is presumed to be uncontaminated soil and (ii) is within a pH range of 6.25 to 9.0. If you have questions about this form, please telephone the Bureau of Land Permit Section at 217/524-3300.

This form may be completed online, saved locally, printed and signed, and submitted to prospective clean construction or demolition debris fill operations or uncontaminated soil fill operations.

I. Source Location Information

(Describe the location of the source of the uncontaminated soil)

Project Name: Receiving and Pumping Stations Office Phone Number, if available: _____

Physical Site Location (Street, Road): Eastern Site and Western Sites along Caton Farm Rd. See attached report.

City: Crest Hill State: IL Zip Code: 60403 County: Will

Township: _____

Lat/Long of approximate center of site in decimal degrees (DD.ddddd) to five decimal places (e.g., 40.67890, -90.12345):

Latitude: 41.56568 Longitude: -88.12088

(Decimal Degrees)

(-Decimal Degrees)

Identify how the lat/long data were determined:

☐ GPS ☒ Map Interpolation ☐ Photo Interpolation ☐ Survey ☐ Other

IEPA Site Number(s), if assigned: BOL: _____ BOW: _____ BOA: _____

Approximate Start Date (mm/dd/yyyy): _____ Approximate End Date (mm/dd/yyyy): _____

Estimated Volume of debris (cu. Yd.): _____

II. Owner/Operator Information for Source Site

Site Owner

Name: _____ City of Crest Hill

Street Address: 20600 City Center Boulevard

PO Box: _____

City: Crest Hill State: IL

Zip Code: 60403 Phone: _____

Contact: _____

Email, if available: _____

Site Operator

Name: _____

Street Address: _____

PO Box: _____

City: _____ State: _____

Zip Code: _____ Phone: _____

Contact: _____

Email, if available: _____

This Agency is authorized to require this information under Section 4 and Title X of the Environmental Protection Act (415 ILCS 5/4, 5/39). Failure to disclose this information may result in: a civil penalty of not to exceed \$50,000 for the violation and an additional civil penalty of not to exceed \$10,000 for each day during which the violation continues (415 ILCS 5/42). This form has been approved by the Forms Management Center.

Source Site Certification**III. Descriptions of Current and Past Uses of Source Site**

Describe the current and past uses of the site and nearby properties.* Attach additional information as needed. The description must take into account, at a minimum, the following for the source site and for nearby property: (1) use of the properties for commercial or industrial purposes; (2) the use, storage or disposal of chemical or petroleum products in individual containers greater than 5 gallons or collectively more than 50 gallons; (3) the current or past presence of any storage tanks (above ground or underground); (4) any waste storage, treatment or disposal at the properties; (5) any reported releases or any environmental cleanup or removal of contaminants; (6) any environmental liens or governmental notification of environmental violations; (7) any contamination in a well that exceeds the Board's groundwater quality standards; (8) the use, storage, or disposal of transformers or capacitors manufactured before 1979; and (9) any fill dirt brought to the properties from an unknown source or site.

Number of pages attached: 143

Prior to a site investigation, an Environmental Database Review (EDR) was conducted for the project area. Based on the EDR six (6) soil samples were collected from the western site and eleven (11) soil samples were collected from the eastern site. All seventeen (17) soil samples were tested for pH. Refer to attached Summary Letter.

*The description must be sufficient to demonstrate that the source site is not potentially impacted property, thereby allowing the source site owner or operator to provide this certification.

IV. Soil pH Testing Results

Describe the results of soil pH testing showing that the soil pH is within the range of 6.25 to 9.0 and attach any supporting documentation.

Number of pages attached: 1

Seventeen (17) samples were collected and tested for pH. Results were within the range of 6.25 to 9.0 . Please refer to pH Results in Appendix A.2

V. Source Site Owner, Operator or Authorized Representative's Certification Statement and Signature

In accordance with the Illinois Environmental Protection Act [415 ILCS 5/22.51 or 22.51a] and 35 Ill. Adm. Code 1100.205(a), I Anthony Tomaras, P.G. Rubino Engineering, Inc. (owner, operator or authorized representative of source site) certify that this site is not a potentially impacted property and the soil is presumed to be uncontaminated soil. I also certify that the soil pH is within the range of 6.25 to 9.0. I further certify that the soil has not been removed from the site as part of a cleanup or removal of contaminants. Additionally, I certify that I am either the site owner or operator or a duly authorized representative of the site owner or site operator and am authorized to sign this form. Furthermore, I certify that all information submitted, including but not limited to, all attachments and other information, is to the best of my knowledge and belief, true, accurate and complete.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

☐ Owner☐ OperatorAnthony Tomaras, P.G. Rubino Engineering, Inc.

Printed Name

Anthony Tomaras
Signature☒ Owner's Duly Authorized Representative☐ Operator's Duly Authorized Representative1-3-25

Date



ENVIRONMENTAL SUMMARY REPORT

January 3, 2025

To: Richard Scheer, P.E.
Strand Associates, Inc.®
1170 South Houbolt Road
Joliet, Illinois 60431

Re: **CCDD Testing Summary Report**
Receiving and Pumping Stations
Eastern Site: Caton Farm Road and Oakland Avenue
Western Site: 2305 – 2309 Caton Farm Road
Crest Hill, Illinois

Rubino Report No. G24.156

Via email: richard.scheer@strand.com; nathan.wisnionski@strand.com

Dear Mr. Scheer,

Rubino Engineering, Inc. (Rubino) is pleased to submit the following report to provide a summary of the CCDD testing for the above referenced project.

This report contains the following:

- *Summary of Environmental Database Review*
- *Summary of field and laboratory tests performed*
- *Summary of laboratory test results*
- *Illinois Environmental Protection Agencies LPC 662 Certificate*

ENVIROMENTAL DATABASE REVIEW

The project is located at two separate sites in Crest Hill, Illinois. The eastern site is located near the intersection of Caton Farm Road and Oakland Avenue. The western site is located at 2305 – 2309 Caton Farm Road. A map of the project locations can be found in **Appendix A.1**. Prior to a site investigation, an Environmental Database Review (EDR) was conducted and the report is included as **Appendix A.3**. After reviewing the EDR report, Rubino. did not find any records of potentially impacted properties in close proximity to the project site that posed an environmental risk.

Based on the fact there were no records of potentially impacted properties in close proximity to the project site that posed an environmental risk, it was determined the project site is not a “potentially impacted property” and therefore only pH sampling of the project site was necessary.

Certification Limits

The LPC 662 Certification Limits include the following locations in Crest Hill, Illinois.

- Eastern Site: Parcel # 11-04-32-200-023-0004 located on the south side of Caton Farm Road approximately 400 feet west of Oakland Avenue
- Western Site: 2305 – 2309 Caton Farm Road

SOIL SAMPLING

During the month of November 2024, Rubino mobilized to the project sites to collect soil samples. The sampling locations can be found in **Appendix A.1**. Six (6) soil samples were collected from the western site. Eleven (11) soil samples were collected from the eastern site. Soil samples were collected to approximate depths ranging from of 10 to 35 feet below existing grade. All seventeen (17) samples were submitted for pH testing at Rubino.

RESULTS

Lab analysis found that the soil samples were within the allowable pH range of 6.25 to 9.0.

The pH lab analysis results and complete reports can be found in **Appendix A.2**.

Based on the results of the laboratory testing performed, an **IEPA LPC #662 (CCDD) Certificate was issued** for the eastern and western sites.

CLOSING

Rubino appreciates the opportunity to provide Clean Construction Demolition Debris (CCDD) services for this project and we look forward to continued participation during the design and in future construction phases of this project.

If you have questions pertaining to this summary report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully submitted,

RUBINO ENGINEERING, INC.



Michelle A. Lipinski, PE
President

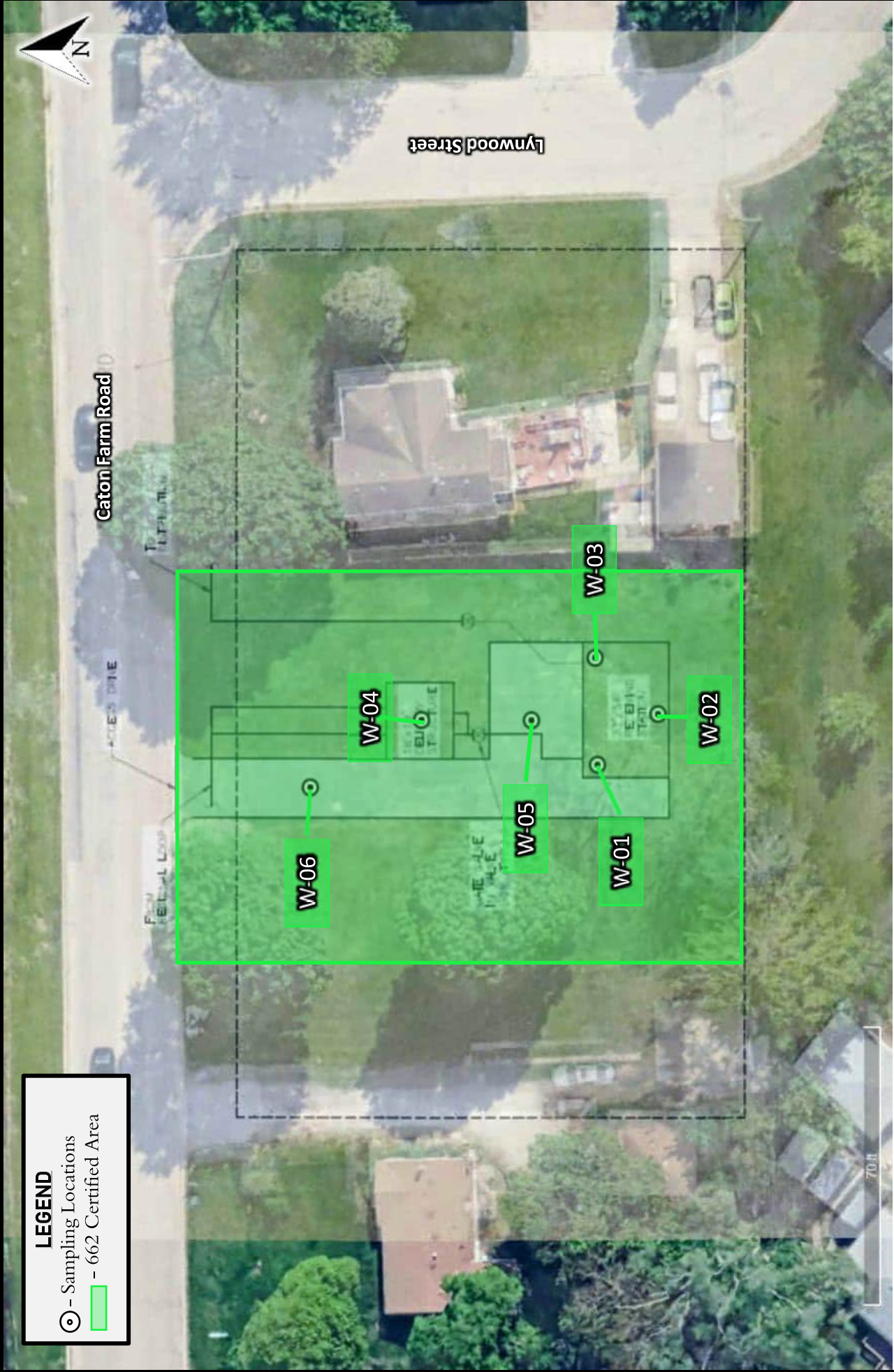
michelle.lipinski@rubinoeng.com

MAL/file/ Enclosures

Appendix Contents

APPENDIX A.1 – SITE MAPS
APPENDIX A.2 – pH RESULTS
APPENDIX A.3 – ERIIS DATABASE REPORT

APPENDIX A.1 – SITE MAPS



LEGEND

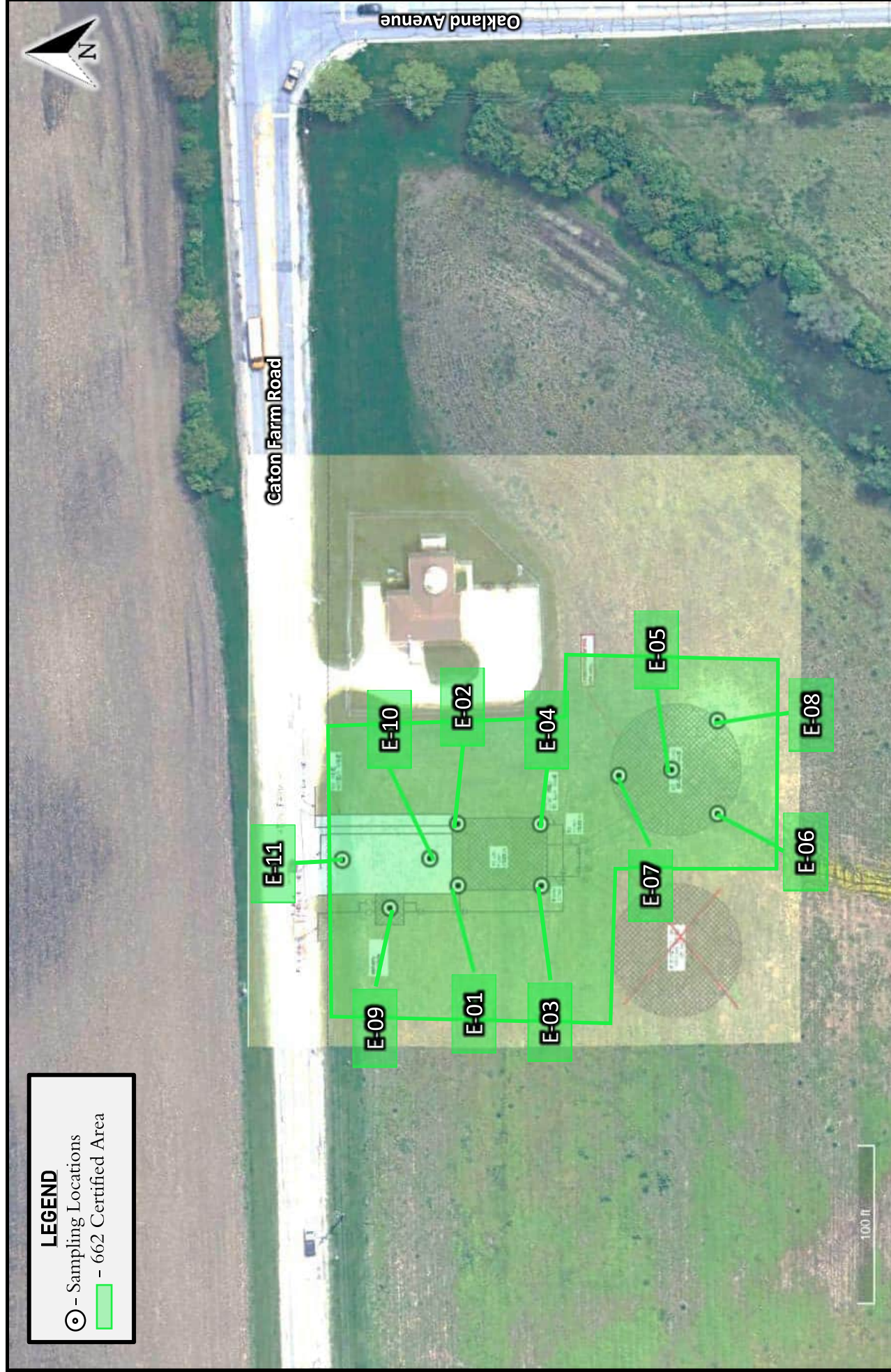
- Sampling Locations

- 662 Certified Area

 425 Shepard Drive Elgin, Illinois 60123	Project Name: Project Location: Client: Rubino Project # : Receiving and Pumping Stations Western Site: Caton Farm Rd & Oakland Ave Crest Hill, Illinois Strand Associates, Inc. G24.156	CCDD Testing Plan 1
---	--	---

LEGEND

- ⊙ - Sampling Locations
- - 662 Certified Area



rubino
ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name: Receiving and Pumping Stations

Project Location: Eastern Site: Caton Farm Rd & Oakland Ave

Crest Hill, Illinois

Client: Strand Associates, Inc.

Rubino Project # : G24.156

**CCDD
Testing
Plan 2**

APPENDIX A.2 – PH RESULTS



ASTM D4972-01
Standard Test Method for pH of Soils

		Date:	26-Dec-24
Project Number:	G24.156	Performed by:	Myrna Fleege
Project Name:	Receiving and Pumping Stations	Title:	Laboratory Technician
City, State:	Crest Hill, Illinois	Signature:	<i>my Fleege</i>
Method Used:	ASTM D4972-01 Method A Calcium Chloride Solution (0.01M)	Client:	Strand Associates, Inc.
pH Meter Mfgr:	Ohaus Corporation	Client Address:	1170 South Houbolt Road Joliet, Illinois
Model #	ST Series PH Analysis Pen	Prior Calibration:	8/20/2024
		Calibration:	11/21/2024

Sample	Sample Type	Mass of Soil (g)	pH in Calcium Chloride Solution	pH in Distilled Water
W-01	Grab	10	7.40	7.77
W-02	Grab	10	7.49	7.86
W-03	Grab	10	7.53	7.89
W-04	Grab	10	7.60	7.87
W-05	Grab	10	7.51	8.07
W-06	Grab	10	7.50	7.98
E-01	Grab	10	7.70	8.02
E-02	Grab	10	7.64	7.95
E-03	Grab	10	7.58	8.15
E-04	Grab	10	7.56	7.86
E-05	Grab	10	7.53	7.75
E-06	Grab	10	7.59	7.90
E-07	Grab	10	7.68	7.89
E-08	Grab	10	7.67	8.04
E-09	Grab	10	7.65	7.94
E-10	Grab	10	7.60	8.13
E-11	Grab	10	7.45	7.96

APPENDIX A.3– ERIS DATABASE REPORT



DATABASE REPORT

Project Property: 41.56589754961628, -88.13821094444911
W
41.56589754961628, -88.13821094444911
Crest Hill IL 60403

Project No:

Report Type: Screen Report Plus

Order No: 25010300188

Requested by: Bluff City Materials, Inc

Date Completed: January 3, 2025

Environmental Risk Information Services

A division of Glacier Media Inc.

1.866.517.5204 | info@erisinfo.com | erisinfo.com

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Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

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Executive Summary

Property Information:

Project Property: 41.56589754961628, -88.13821094444911W
41.56589754961628, -88.13821094444911 Crest Hill IL 60403

Project No:

Coordinates:

Latitude: 41.5658975
Longitude: -88.1382109
UTM Northing: 4,602,205.62
UTM Easting: 405,097.37
UTM Zone: 16T

Elevation: 628 FT

Order Information:

Order No: 25010300188
Date Requested: January 3, 2025
Requested by: Bluff City Materials, Inc
Report Type: Screen Report Plus

Historicals/Products:

ERIS Xplorer [ERIS Xplorer](#)
Excel Add-On Excel Add-On

Executive Summary: Report Summary

<i>Database</i>	<i>Searched</i>	<i>Project Property</i>	<i>Within 0.250mi</i>	<i>Total</i>
<u>Standard Environmental Records</u>				
Federal				
NPL	Y	0	0	0
PROPOSED NPL	Y	0	0	0
DELETED NPL	Y	0	0	0
SEMS	Y	0	0	0
SEMS ARCHIVE	Y	0	0	0
ODI	Y	0	0	0
CERCLIS	Y	0	0	0
IODI	Y	0	0	0
CERCLIS NFRAP	Y	0	0	0
CERCLIS LIENS	Y	0	0	0
RCRA CORRACTS	Y	0	0	0
RCRA TSD	Y	0	0	0
RCRA LQG	Y	0	0	0
RCRA SQG	Y	0	0	0
RCRA VSQG	Y	0	1	1
RCRA NON GEN	Y	0	1	1
RCRA CONTROLS	Y	0	0	0
FED ENG	Y	0	0	0
FED INST	Y	0	0	0
LUCIS	Y	0	0	0
NPL IC	Y	0	0	0
ERNS 1982 TO 1986	Y	0	0	0
ERNS 1987 TO 1989	Y	0	0	0
ERNS	Y	0	0	0
FED BROWNFIELDS	Y	0	0	0
FEMA UST	Y	0	0	0

Database	Searched	Project Property	Within 0.250mi	Total
FRP	Y	0	0	0
DELISTED FRP	Y	0	0	0
HIST GAS STATIONS	Y	0	0	0
REFN	Y	0	0	0
BULK TERMINAL	Y	0	0	0
SEMS LIEN	Y	0	0	0
SUPERFUND ROD	Y	0	0	0
DOE FUSRAP	Y	0	0	0

State

SSU	Y	0	0	0
DELISTED SSU	Y	0	0	0
SWF/LF	Y	0	0	0
SWF/LF SPECIAL	Y	0	0	0
NIPC	Y	0	0	0
CCDD	Y	0	0	0
LUST	Y	0	3	3
LUST DOCUMENT	Y	0	2	2
DELISTED LUST	Y	0	0	0
LUST TRUST	Y	0	0	0
UST	Y	0	2	2
AST	Y	0	0	0
DELISTED TANK	Y	0	0	0
ENG	Y	0	0	0
INST	Y	0	0	0
AUL	Y	0	0	0
SRP	Y	0	0	0
REM ASSESS	Y	0	0	0
BROWNFIELDS	Y	0	0	0
BROWN MBRGP	Y	0	0	0

Tribal

INDIAN LUST	Y	0	0	0
INDIAN UST	Y	0	0	0
DELISTED INDIAN LST	Y	0	0	0
DELISTED INDIAN UST	Y	0	0	0

County

No County databases were selected to be included in the search.

Additional Environmental Records

<i>Database</i>	<i>Searched</i>	<i>Project Property</i>	<i>Within 0.250mi</i>	<i>Total</i>
Federal				
PFAS GHG	Y	0	0	0
OSC RESPONSE	Y	0	0	0
FINDS/FRS	Y	0	6	6
TRIS	Y	0	0	0
HMIRS	Y	0	0	0
NCDL	Y	0	0	0
TSCA	Y	0	0	0
HIST TSCA	Y	0	0	0
FTTS ADMIN	Y	0	0	0
FTTS INSP	Y	0	0	0
PRP	Y	0	0	0
SCRD DRYCLEANER	Y	0	0	0
ICIS	Y	0	0	0
FED DRYCLEANERS	Y	0	0	0
DELISTED FED DRY	Y	0	0	0
FUDS	Y	0	0	0
FUDS MRS	Y	0	0	0
FORMER NIKE	Y	0	0	0
PIPELINE INCIDENT	Y	0	0	0
MLTS	Y	0	0	0
HIST MLTS	Y	0	0	0
MINES	Y	0	0	0
SMCRA	Y	0	0	0
MRDS	Y	0	0	0
LM SITES	Y	0	0	0
ALT FUELS	Y	0	0	0
CONSENT DECREES	Y	0	0	0
AFS	Y	0	0	0
SSTS	Y	0	0	0
PCBT	Y	0	0	0
PCB	Y	0	0	0
POWER PLANTS	Y	0	0	0
State				
SPILLS	Y	0	3	3
SPILL OER	Y	0	0	0
DRYCLEANERS	Y	0	0	0
DELISTED DRYCLEANERS	Y	0	0	0
IEPA DOCS	Y	0	4	4
CDL	Y	0	0	0

Database	Searched	Project Property	Within 0.250mi	Total
TIER 2	Y	0	0	0
AIR PERMITS	Y	0	1	1
UIC	Y	0	0	0
MEDICAL WASTE	Y	0	0	0
COMPOST	Y	0	0	0

Tribal *No Tribal additional environmental record sources available for this State.*

County *No County additional environmental record sources available for this State.*

Total:	0	23	23
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Executive Summary: Site Report Summary - Project Property

<i>Map Key</i>	<i>DB</i>	<i>Company/Site Name</i>	<i>Address</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev Diff (ft)</i>	<i>Page Number</i>
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No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	IEPA DOCS	Smolik, Richard R	2353 Greengold Crest Hill IL 60435	WSW	0.08 / 401.52	-1	18
2	UST	Crest Hill Shell	2350 Plainfield Road Crest Hill, IL 60435 Crest Hill IL Facility No Facility Status: 2041253 Active Tank No Status Removed Date: 1 Currently in use , 2 Currently in use , 3 Currently in use	SW	0.13 / 661.89	-2	18
2	FINDS/FRS	SHELL	2350 PLAINFIELD RD CREST HILL IL 60435 Registry ID: 110070683664	SW	0.13 / 661.89	-2	23
2	AIR PERMITS	Shell	2350 Plainfield Rd Crest Hill IL 60435	SW	0.13 / 661.89	-2	24
3	FINDS/FRS	BIG BROTHERS & SISTERS	2322 PLAINFIELD RD CREST HILL IL 60403 Registry ID: 110037065261	SW	0.13 / 672.47	-2	25
4	RCRA VSQG	DR BRAUN	2312 PLAINFIELD RD CREST HILL IL 60435 EPA Handler ID Recycler Activity?: ILR000045823 NO	SSW	0.13 / 705.22	-2	25
4	FINDS/FRS	BRAUN, DR	2312 PLAINFIELD RD CREST HILL IL 60403-1851 Registry ID: 110005960576	SSW	0.13 / 705.22	-2	27
4	IEPA DOCS	Braun, Dr	2312 Plainfield Rd Crest Hill IL 60435	SSW	0.13 / 705.22	-2	28
5	LUST	Amoco Oil Co. #15795	Rt. 30 & Caton Farm Rd. Crest Hill IL 60435 Incident No Incidents ID NFR Date: 921518 13250 04/10/2000	W	0.21 / 1,135.09	-2	28
5	FINDS/FRS	AAA COOPER TRANSPORT	RTE 30 & CATON FARM RD- A CREST HILL IL 60435 Registry ID: 110018408267	W	0.21 / 1,135.09	-2	29
5	FINDS/FRS	AMOCO 15795	RTE 30 & CATON FARM RD- B CREST HILL IL 60435 Registry ID: 110018151319	W	0.21 / 1,135.09	-2	29
5	SPILLS	AMOCO OIL COMPANY	RT. 30 & CATON FARM RD. CRESTHILL IL Incident No: 921518	W	0.21 / 1,135.09	-2	30

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
5	LUST DOCUMENT	Amoco 15795	Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	W	0.21 / 1,135.09	-2	31
5	IEPA DOCS	Amoco 15795	Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	W	0.21 / 1,135.09	-2	32
6	RCRA NON GEN	AMOCO 15795	RT 30 AND CATON FARM CREST HILL IL 60435 EPA Handler ID Recycler Activity?: ILD984886655 NO	W	0.22 / 1,135.21	-2	32
7	LUST	Reichart, Sam	2400 Plainfield Rd. Crest Hill IL 60435 Incident No Incidents ID NFR Date: 990738 23449 10/17/2005	W	0.24 / 1,271.16	-1	34
7	LUST	Reichart, Sam	2400 Plainfield Rd. Crest Hill IL 60435 Incident No Incidents ID NFR Date: 891281 6562 10/17/2005	W	0.24 / 1,271.16	-1	35
7	UST	Swansons Service Center	2400 Plainfield Rd Crest Hill, IL 60435 Crest Hill IL Facility No Facility Status: 2025854 Closed Tank No Status Removed Date: 3 Removed 7/19/1989, 4 Removed 3/26/1999, 1 Removed 7/19/1989, 5 Removed 3/26/1999, 6 Removed 3/26/1999, 2 Removed 7/19/1989	W	0.24 / 1,271.16	-1	35
7	FINDS/FRS	SAMS SVC STATION	2400 PLAINFIELD RD CREST HILL IL 60435 Registry ID: 110018408329	W	0.24 / 1,271.16	-1	38
7	SPILLS	SAMES SERVICE STATION	2400 Plainfield Road CREST HILL IL Incident No: 891281	W	0.24 / 1,271.16	-1	38
7	SPILLS	SAM REICHART	2400 PLAINFIELD ROAD CREST HILLS IL Incident No: 990738	W	0.24 / 1,271.16	-1	40
7	LUST DOCUMENT	Sams Svc Station	2400 Plainfield Rd Crest Hill IL 60435	W	0.24 / 1,271.16	-1	41
7	IEPA DOCS	Sams Svc Station	2400 Plainfield Rd Crest Hill IL 60435	W	0.24 / 1,271.16	-1	42

Executive Summary: Summary by Data Source

Standard

Federal

RCRA VSQG - RCRA Very Small Quantity Generators List

A search of the RCRA VSQG database, dated Oct 21, 2024 has found that there are 1 RCRA VSQG site(s) within approximately 0.25 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
DR BRAUN	2312 PLAINFIELD RD CREST HILL IL 60435	SSW	0.13 / 705.22	<u>4</u>
<i>EPA Handler ID Recycler Activity?: ILR000045823 NO</i>				

RCRA NON GEN - RCRA Non-Generators

A search of the RCRA NON GEN database, dated Oct 21, 2024 has found that there are 1 RCRA NON GEN site(s) within approximately 0.25 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
AMOCO 15795	RT 30 AND CATON FARM CREST HILL IL 60435	W	0.22 / 1,135.21	<u>6</u>
<i>EPA Handler ID Recycler Activity?: ILD984886655 NO</i>				

State

LUST - Leaking Underground Storage Tanks (LUST)

A search of the LUST database, dated Nov 15, 2024 has found that there are 3 LUST site(s) within approximately 0.50 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Amoco Oil Co. #15795	Rt. 30 & Caton Farm Rd. Crest Hill IL 60435	W	0.21 / 1,135.09	<u>5</u>
<i>Incident No Incidents ID NFR Date: 921518 13250 04/10/2000</i>				
Reichart, Sam	2400 Plainfield Rd. Crest Hill IL 60435	W	0.24 / 1,271.16	<u>7</u>
<i>Incident No Incidents ID NFR Date: 891281 6562 10/17/2005</i>				
Reichart, Sam	2400 Plainfield Rd. Crest Hill IL 60435	W	0.24 / 1,271.16	<u>7</u>
<i>Incident No Incidents ID NFR Date: 990738 23449 10/17/2005</i>				

LUST DOCUMENT - Leaking UST Document

A search of the LUST DOCUMENT database, dated Jul 23, 2024 has found that there are 2 LUST DOCUMENT site(s) within approximately 0.50 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Amoco 15795	Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	W	0.21 / 1,135.09	<u>5</u>
Sams Svc Station	2400 Plainfield Rd Crest Hill IL 60435	W	0.24 / 1,271.16	<u>7</u>

UST - Underground Storage Tank Database (UST)

A search of the UST database, dated Oct 21, 2024 has found that there are 2 UST site(s) within approximately 0.25 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Crest Hill Shell	2350 Plainfield Road Crest Hill, IL 60435 Crest Hill IL Facility No Facility Status: 2041253 Active Tank No Status Removed Date: 1 Currently in use , 2 Currently in use , 3 Currently in use	SW	0.13 / 661.89	<u>2</u>
Swansons Service Center	2400 Plainfield Rd Crest Hill, IL 60435 Crest Hill IL Facility No Facility Status: 2025854 Closed Tank No Status Removed Date: 3 Removed 7/19/1989, 4 Removed 3/26/1999, 1 Removed 7/19/1989, 5 Removed 3/26/1999, 6 Removed 3/26/1999, 2 Removed 7/19/1989	W	0.24 / 1,271.16	<u>7</u>

Non Standard

Federal

FINDS/FRS - Facility Registry Service/Facility Index

A search of the FINDS/FRS database, dated Aug 1, 2024 has found that there are 6 FINDS/FRS site(s) within approximately 0.02 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
SHELL	2350 PLAINFIELD RD CREST HILL IL 60435 Registry ID: 110070683664	SW	0.13 / 661.89	<u>2</u>
BIG BROTHERS & SISTERS	2322 PLAINFIELD RD CREST HILL IL 60403 Registry ID: 110037065261	SW	0.13 / 672.47	<u>3</u>
BRAUN, DR	2312 PLAINFIELD RD CREST HILL IL 60403-1851 Registry ID: 110005960576	SSW	0.13 / 705.22	<u>4</u>

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
AAA COOPER TRANSPORT	RTE 30 & CATON FARM RD-A CREST HILL IL 60435	W	0.21 / 1,135.09	5
	Registry ID: 110018408267			
AMOCO 15795	RTE 30 & CATON FARM RD-B CREST HILL IL 60435	W	0.21 / 1,135.09	5
	Registry ID: 110018151319			
SAMS SVC STATION	2400 PLAINFIELD RD CREST HILL IL 60435	W	0.24 / 1,271.16	7
	Registry ID: 110018408329			

State

SPILLS - Spills and Incidents

A search of the SPILLS database, dated Sep 11, 2024 has found that there are 3 SPILLS site(s) within approximately 0.12 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
AMOCO OIL COMPANY	RT. 30 & CATON FARM RD. CRESTHILL IL	W	0.21 / 1,135.09	5
	Incident No: 921518			
SAM REICHART	2400 PLAINFIELD ROAD CREST HILLS IL	W	0.24 / 1,271.16	7
	Incident No: 990738			
SAMES SERVICE STATION	2400 Plainfield Road CREST HILL IL	W	0.24 / 1,271.16	7
	Incident No: 891281			

IEPA DOCS - IEPA Document Explorer

A search of the IEPA DOCS database, dated Jul 23, 2024 has found that there are 4 IEPA DOCS site(s) within approximately 0.02 miles of the project property.

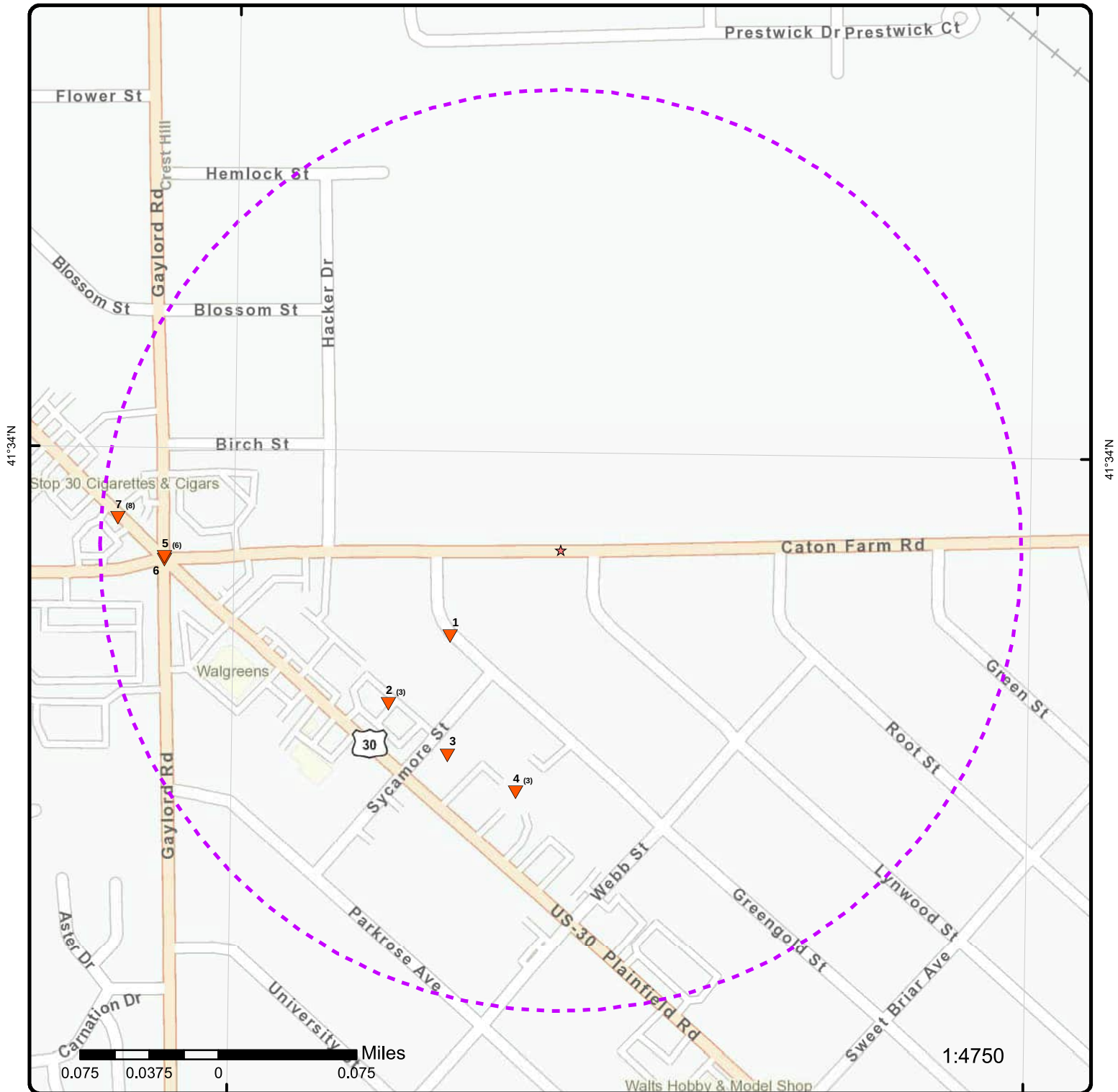
<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Smolik, Richard R	2353 Greengold Crest Hill IL 60435	WSW	0.08 / 401.52	1
Braun, Dr	2312 Plainfield Rd Crest Hill IL 60435	SSW	0.13 / 705.22	4
Amoco 15795	Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	W	0.21 / 1,135.09	5

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Sams Svc Station	2400 Plainfield Rd Crest Hill IL 60435	W	0.24 / 1,271.16	7

AIR PERMITS - Air Permits

A search of the AIR PERMITS database, dated Jul 23, 2024 has found that there are 1 AIR PERMITS site(s) within approximately 0.25 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Shell	2350 Plainfield Rd Crest Hill IL 60435	SW	0.13 / 661.89	2



Map: 0.25 Mile Radius

Order Number: 25010300188

Address: 41.56589754961628, -88.13821094444911, Crest Hill, IL



- ★ Project Property
- Buffer Outline
- ▲ Sites with Higher Elevation
- Sites with Same Elevation
- ▼ Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

88°9'W 88°8'30"W 88°8'W

41°34'30"N

41°34'30"N

41°34'N

41°34'N

41°33'30"N

41°33'30"N



Aerial Year: 2023

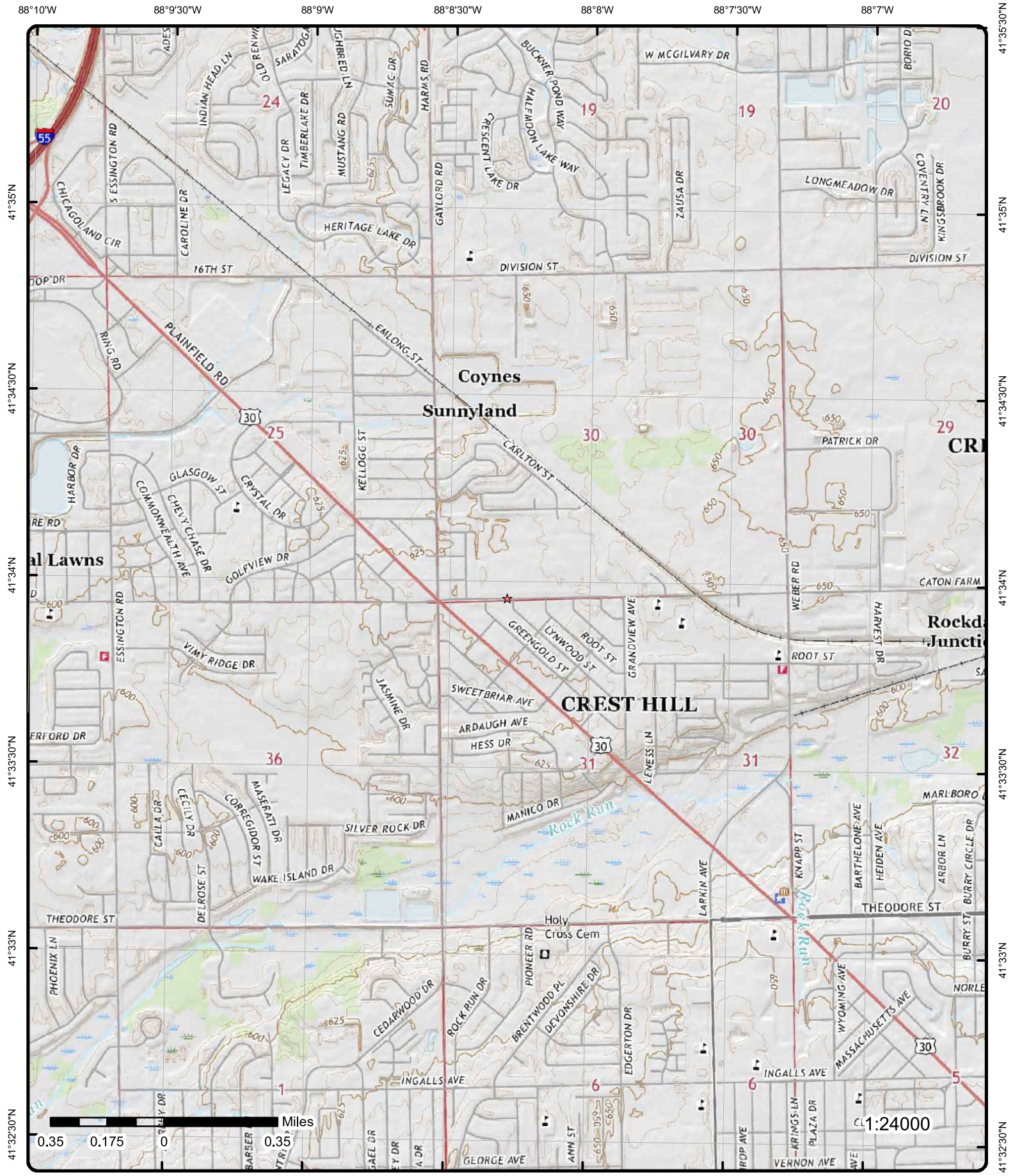
Order Number: 25010300188

Address: 41.56589754961628, -88.13821094444911, Crest Hill, IL



© ERIS Information Inc.

Source: ESRI World Imagery



Topographic Map Year: 2021 Order Number: 25010300188

Address: 41.56589754961628, -88.13821094444911, IL

Quadrangle(s): Plainfield IL

Source: USGS Topographic Map



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Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	1 of 1	WSW	0.08 / 401.52	626.35 / -1	Smolik, Richard R 2353 Greengold Crest Hill IL 60435	IEPA DOCS

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Smolik, Richard R
Location Addr 3: 2353 Greengold
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.56485
Site ID:	170000803771	Longitude Measure:	-88.13923
System ID:	1970255030	Point X:	-88.13922999999994
Collection Dt:	12/30/2003	Point Y:	41.5648500000000035
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

2	1 of 3	SW	0.13 / 661.89	625.71 / -2	Crest Hill Shell 2350 Plainfield Road Crest Hill, IL 60435 Crest Hill IL	UST
Facility No:	2041253			Facility Type:	Attended Self-Service Station	
Facility Status:	Active			Owner Type:	Private	
Fac Details Status:	Active			Owner Status:	Current Owner	
Fac Type Fac Details:	Attended Self-Service Station			County:	Will	
Owner Name:	Sarjudas Corporation					
Facility URL:	http://webapps.sfm.illinois.gov/ustsearch/Facility.aspx?ID=2041253					
Permit History Link:	https://webapps.sfm.illinois.gov/USTPortal/Permit/FacilityPermitList/2041253					

Tank Information

Tank No:	1	Capacity:	12000
UI No:		Petroleum Use:	
Status:	Currently in use	Product:	Gasoline - Regular
Removed Date:		CERCLA Substance:	

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Install Date:	11/6/2002				Current Age:	21
Abandoned Date:					Abandoned Material:	
Last Used Date:					Product Date:	
Red Tag Issue Date:					Fee Due:	\$0.00
CAS Code:					Regulated Status:	Federal
OSFM First Noti Dt:	5/8/2003					
<u>Tank Equipment</u>						
Equipment Type:	Corrosion Prot - Piping				Last Passing Date:	N/A
Equipment:	Flexible Non-Corrosive				Test Expire Date:	N/A
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Overfill Prev Device				Last Passing Date:	8/3/2023
Equipment:	Overfill Drop Tube Valve				Test Expire Date:	8/3/2026
Install Date:	8/3/2023				Failed Test Date:	
Equipment Type:	Leak Detect - Piping				Last Passing Date:	1/11/2024
Equipment:	Electronic Pressurized Line Leak Detection				Test Expire Date:	1/11/2025
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Spill Contain Device				Last Passing Date:	2/24/2023
Equipment:	Single Wall Spill Bucket				Test Expire Date:	2/24/2026
Install Date:	2/24/2023				Failed Test Date:	
Equipment Type:	Leak Detect - Tank				Last Passing Date:	1/11/2024
Equipment:	Automatic Tank Gauging Veeder Root TLS 350 Plus				Test Expire Date:	1/11/2025
Install Date:					Failed Test Date:	
Equipment Type:	Leak Detect - Piping				Last Passing Date:	1/11/2024
Equipment:	Sump Sensor				Test Expire Date:	1/11/2025
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Tank				Last Passing Date:	N/A
Equipment:	Composite Double Wall Glasteel II				Test Expire Date:	N/A
Install Date:					Failed Test Date:	
Equipment Type:	Piping				Last Passing Date:	N/A
Equipment:	Flexible Double Wall Environ Geo Flex				Test Expire Date:	N/A
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Corrosion Prot - Tank				Last Passing Date:	N/A
Equipment:	Composite Non-Corrosive				Test Expire Date:	N/A
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Piping				Last Passing Date:	11/28/2022
Equipment:	Single Wall STP/Tanktop Sump				Test Expire Date:	11/28/2025
Install Date:	10/9/2019				Failed Test Date:	

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
<u>Tank Information</u>						
Tank No:	2			Capacity:	8000	
UI No:				Petroleum Use:		
Status:	Currently in use			Product:	Gasoline - Premium	
Removed Date:				CERCLA Substance:		
Install Date:	11/6/2002			Current Age:	21	
Abandoned Date:				Abandoned Material:		
Last Used Date:				Product Date:		
Red Tag Issue Date:				Fee Due:	\$0.00	
CAS Code:				Regulated Status:	Federal	
OSFM First Noti Dt:	5/8/2003					
<u>Tank Equipment</u>						
Equipment Type:	Leak Detect - Piping			Last Passing Date:	1/11/2024	
Equipment:	Sump Sensor			Test Expire Date:	1/11/2025	
Install Date:	4/16/2003			Failed Test Date:		
Equipment Type:	Leak Detect - Piping			Last Passing Date:	1/11/2024	
Equipment:	Electronic Pressurized Line Leak Detection			Test Expire Date:	1/11/2025	
Install Date:	4/16/2003			Failed Test Date:		
Equipment Type:	Leak Detect - Tank			Last Passing Date:	1/11/2024	
Equipment:	Automatic Tank Gauging Veeder Root TLS 350 Plus			Test Expire Date:	1/11/2025	
Install Date:				Failed Test Date:		
Equipment Type:	Spill Contain Device			Last Passing Date:	8/3/2023	
Equipment:	Double Wall Spill Bucket			Test Expire Date:	8/3/2026	
Install Date:	8/3/2023			Failed Test Date:		
Equipment Type:	Piping			Last Passing Date:	N/A	
Equipment:	Flexible Double Wall Environ Geo Flex			Test Expire Date:	N/A	
Install Date:	4/16/2003			Failed Test Date:		
Equipment Type:	Piping			Last Passing Date:	11/28/2022	
Equipment:	Single Wall STP/Tanktop Sump			Test Expire Date:	11/28/2025	
Install Date:	10/9/2019			Failed Test Date:		
Equipment Type:	Overfill Prev Device			Last Passing Date:	8/3/2023	
Equipment:	Overfill Drop Tube Valve			Test Expire Date:	8/3/2026	
Install Date:	8/3/2023			Failed Test Date:		
Equipment Type:	Tank			Last Passing Date:	N/A	
Equipment:	Composite Double Wall Glasteel II			Test Expire Date:	N/A	
Install Date:				Failed Test Date:		
Equipment Type:	Corrosion Prot - Tank			Last Passing Date:	N/A	
Equipment:	Composite Non-Corrosive			Test Expire Date:	N/A	
Install Date:	4/16/2003			Failed Test Date:		

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Equipment Type:	Corrosion Prot - Piping				Last Passing Date:	N/A
Equipment:	Flexible Non-Corrosive				Test Expire Date:	N/A
Install Date:	4/16/2003				Failed Test Date:	
<u>Tank Information</u>						
Tank No:	3				Capacity:	4000
UI No:					Petroleum Use:	
Status:	Currently in use				Product:	Diesel Fuel
Removed Date:					CERCLA Substance:	
Install Date:	11/6/2002				Current Age:	21
Abandoned Date:					Abandoned Material:	
Last Used Date:					Product Date:	
Red Tag Issue Date:					Fee Due:	\$0.00
CAS Code:					Regulated Status:	Federal
OSFM First Noti Dt:	5/8/2003					
<u>Tank Equipment</u>						
Equipment Type:	Leak Detect - Tank				Last Passing Date:	1/11/2024
Equipment:	Automatic Tank Gauging Veeder Root TLS 350 Plus				Test Expire Date:	1/11/2025
Install Date:					Failed Test Date:	
Equipment Type:	Overfill Prev Device				Last Passing Date:	N/A
Equipment:	Ball Only Removed Ball Float Vent Valve				Test Expire Date:	N/A
Install Date:	2/21/2020				Failed Test Date:	
Equipment Type:	Piping				Last Passing Date:	11/28/2022
Equipment:	Single Wall STP/Tanktop Sump				Test Expire Date:	11/28/2025
Install Date:	10/9/2019				Failed Test Date:	
Equipment Type:	Leak Detect - Piping				Last Passing Date:	1/11/2024
Equipment:	Sump Sensor				Test Expire Date:	1/11/2025
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Tank				Last Passing Date:	N/A
Equipment:	Composite Double Wall Glasteel II				Test Expire Date:	N/A
Install Date:					Failed Test Date:	
Equipment Type:	Spill Contain Device				Last Passing Date:	11/28/2022
Equipment:	Single Wall Spill Bucket				Test Expire Date:	11/28/2025
Install Date:	2/21/2020				Failed Test Date:	
Equipment Type:	Piping				Last Passing Date:	N/A
Equipment:	Flexible Double Wall Environ Geo Flex				Test Expire Date:	N/A
Install Date:	4/16/2003				Failed Test Date:	
Equipment Type:	Leak Detect - Piping				Last Passing Date:	1/11/2024

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Equipment:	Electronic Pressurized Line Leak Detection			Test Expire Date:	1/11/2025	
Install Date:	4/16/2003			Failed Test Date:		
Equipment Type:	Overfill Prev Device			Last Passing Date:	7/10/2023	
Equipment:	Overfill Drop Tube Valve			Test Expire Date:	7/10/2026	
Install Date:	2/21/2020			Failed Test Date:		
Equipment Type:	Corrosion Prot - Piping			Last Passing Date:	N/A	
Equipment:	Flexible Non-Corrosive			Test Expire Date:	N/A	
Install Date:	4/16/2003			Failed Test Date:		
Equipment Type:	Corrosion Prot - Tank			Last Passing Date:	N/A	
Equipment:	Composite Non-Corrosive			Test Expire Date:	N/A	
Install Date:	4/16/2003			Failed Test Date:		
<u>Owner Summary</u>						
Owner No:	U0035224			Owner Status:	Former Owner	
Owner Name:	Jetsonic LLC			Purchase Date:	4/1/2011	
Ownership History:	https://webapps.sfm.illinois.gov/ustsearch/Ownership.aspx?ID=2041253					
<u>Owner Summary</u>						
Owner No:	U0036278			Owner Status:	Current Owner	
Owner Name:	Sarjudas Corporation			Purchase Date:		
Ownership History:	https://webapps.sfm.illinois.gov/ustsearch/Ownership.aspx?ID=2041253					
<u>Owner Details</u>						
Owner Name:	Sarjudas Corporation			Type Financial Resp:	Commercial Insurance	
Owner Status:	Current Owner			Fin Resp Rpt Due:	4/25/2024	
Purchase Date:						
Owner Address:	2350 Plainfield Road Crest Hill, IL 60403					
<u>Owner Summary</u>						
Owner No:	U0030867			Owner Status:	Former Owner	
Owner Name:	GRB			Purchase Date:		
Ownership History:	https://webapps.sfm.illinois.gov/ustsearch/Ownership.aspx?ID=2041253					
<u>Dispenser Information</u>						
Name ID:	1/2					
Status:	Active					
Sensor Shuts Down Product Pum:	Unknown					
Name ID:	7/8					

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Status:		Active				
Sensor Shuts Down Product Pum:		Unknown				
Name ID:		9/10				
Status:		Active				
Sensor Shuts Down Product Pum:		Unknown				
Name ID:		3/4				
Status:		Active				
Sensor Shuts Down Product Pum:		Unknown				
Name ID:		11/12				
Status:		Active				
Sensor Shuts Down Product Pum:		Unknown				
Name ID:		5/6				
Status:		Active				
Sensor Shuts Down Product Pum:		Unknown				
 <u>Facility Details</u>						
MFD Forms Status:				Green Tag Decal:	Y002851	
MFD Permit Issue Dt:	1/22/2024			Green Tag Issue Date:	1/22/2024	
MFD Permit Exp Dt:	12/31/2025			Green Tag Exp Date:	12/31/2025	
Property Parcel:				Motor Fuel Type:	Self Service	
Pending Nov:	No					
Status:		Active				
Permit History Link:		https://webapps.sfm.illinois.gov/USTPortal/Permit/FacilityPermitList/2041253				
 <u>Motorfuel Dispensing Permit</u>						
Status:		No Forms Found				
Letter:						
MFD Received Date:						
MFD Name:						
MFD City:						
2	2 of 3	SW	0.13 / 661.89	625.71 / -2	SHELL 2350 PLAINFIELD RD CREST HILL IL 60435	FINDS/FRS
Registry ID:		110070683664				
FIPS Code:		IL197				
HUC Code:		07120004				
Site Type Name:		STATIONARY				
Location Description:						
Supplemental Location:						
Create Date:		10-FEB-20				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Update Date:						
Interest Types:		AIR MINOR				
SIC Codes:		5541				
SIC Code Descriptions:		GASOLINE SERVICE STATIONS				
NAICS Codes:		447190				
NAICS Code Descriptions:		OTHER GASOLINE STATIONS.				
Conveyor:		FRS-GEocode				
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:		13				
Census Block Code:		171978809012030				
EPA Region Code:		05				
County Name:		WILL COUNTY				
US/Mexico Border Ind:						
Latitude:		41.56431				
Longitude:		-88.14012				
Reference Point:		CENTER OF A FACILITY OR STATION				
Coord Collection Method:		ADDRESS MATCHING-HOUSE NUMBER				
Accuracy Value:		30				
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110070683664				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						

2	3 of 3	SW	0.13 / 661.89	625.71 / -2	Shell 2350 Plainfield Rd Crest Hill IL 60435	AIR PERMITS
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Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

Data Source: IEPA Source Water Assessment Program (SWAP) & Mapping Tool (Map)

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Shell

Location Addr 3: 2350 Plainfield Rd

City Name: Crest Hill

State Code: IL

Postal Code: 60435

Details

Indicator:	No	Revision Dt Time:	1/22/2020
Site ID:	170002407759	Collection Dt:	1/24/2020
System ID:	197025ACB	Latitude Measure:	41.564637
RID:	1741059	Longitude Measure:	-88.139961

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Interest Type:	PERMIT EXEMPT			Point X:	-88.13996099999997	
Media Code:	AIR			Point Y:	41.564637000000006	

3	1 of 1	SW	0.13 / 672.47	625.69 / -2	BIG BROTHERS & SISTERS 2322 PLAINFIELD RD CREST HILL IL 60403	FINDS/FRS
Registry ID: 110037065261 FIPS Code: 17197 HUC Code: 07120004 Site Type Name: STATIONARY Location Description: Supplemental Location: Create Date: 15-JUL-08 Update Date: 22-JAN-09 Interest Types: STATE MASTER SIC Codes: SIC Code Descriptions: NAICS Codes: NAICS Code Descriptions: Conveyor: FRS-GEOCODE Federal Facility Code: Federal Agency Name: Tribal Land Code: Tribal Land Name: Congressional Dist No: 13 Census Block Code: 171978809012031 EPA Region Code: 05 County Name: WILL US/Mexico Border Ind: Latitude: 41.56402 Longitude: -88.13967 Reference Point: CENTER OF A FACILITY OR STATION Coord Collection Method: ADDRESS MATCHING-HOUSE NUMBER Accuracy Value: 30 Datum: NAD83 Source: Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110037065261 Data Source: Facility Registry Service - Single File Program Acronyms:						

4	1 of 3	SSW	0.13 / 705.22	626.02 / -2	DR BRAUN 2312 PLAINFIELD RD CREST HILL IL 60435	RCRA VSQG
EPA Handler ID: ILR000045823 Gen Status Universe: VSG Contact Name: TERICA WILSON Contact Address: 2312 PLAINFIELD RD , , CREST HILL , IL, 60435 , US Contact Phone No and Ext: 815-744-7175						

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Contact Email:

Contact Country:

US

County Name:

WILL

EPA Region:

05

Land Type:

Private

Receive Date:

19971128

Location Latitude:

41.563652

Location Longitude:

-88.139051

Recycler Activity?:

NO

Recycler Activity Note:

This facility has no indication of Recycling Activity.

Violation/Evaluation Summary

Note:

NO RECORDS: As of Oct 2024, there are no Compliance Monitoring and Enforcement (violation) records associated with this facility (EPA ID).

Handler Summary

Importer Activity:

No

Mixed Waste Generator:

No

Transporter Activity:

No

Transfer Facility:

No

Onsite Burner Exemption:

No

Furnace Exemption:

No

Underground Injection Activity:

No

Commercial TSD:

No

Used Oil Transporter:

No

Used Oil Transfer Facility:

No

Used Oil Processor:

No

Used Oil Refiner:

No

Used Oil Burner:

No

Used Oil Market Burner:

No

Used Oil Spec Marketer:

No

Recycler Activity:

No

Recycler Act W.O. Storage:

No

Hazardous Waste Handler Details

Sequence No:

1

Receive Date:

19971128

Handler Name:

DR BRAUN

Federal Waste Generator Code:

3

Generator Code Description:

Very Small Quantity Generator

Source Type:

Notification

Waste Code Details

Hazardous Waste Code:

D001

Waste Code Description:

IGNITABLE WASTE

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	2312 PLAINFIELD RD
Name:	BRAUN TOM DR DDS MS	Street 2:	
Date Became Current:		City:	CREST HILL
Date Ended Current:		State:	IL
Phone:	815-744-7175	Country:	
Source Type:	Notification	Zip Code:	60435

4	2 of 3	SSW	0.13 / 705.22	626.02 / -2	BRAUN, DR 2312 PLAINFIELD RD CREST HILL IL 60403-1851	FINDS/FRS
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Registry ID:	110005960576
FIPS Code:	17197
HUC Code:	07120004
Site Type Name:	STATIONARY
Location Description:	
Supplemental Location:	
Create Date:	01-MAR-00
Update Date:	26-JAN-12
Interest Types:	STATE MASTER, VSQG
SIC Codes:	
SIC Code Descriptions:	
NAICS Codes:	
NAICS Code Descriptions:	
Conveyor:	FRS-GEocode
Federal Facility Code:	
Federal Agency Name:	
Tribal Land Code:	
Tribal Land Name:	
Congressional Dist No:	13
Census Block Code:	171978809012031
EPA Region Code:	05
County Name:	WILL
US/Mexico Border Ind:	
Latitude:	41.56363
Longitude:	-88.13907
Reference Point:	CENTER OF A FACILITY OR STATION
Coord Collection Method:	ADDRESS MATCHING-HOUSE NUMBER
Accuracy Value:	30
Datum:	NAD83
Source:	
Facility Detail Rprt URL:	https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110005960576
Data Source:	Facility Registry Service - Single File
Program Acronyms:	

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
4	3 of 3	SSW	0.13 / 705.22	626.02 / -2	Braun, Dr 2312 Plainfield Rd Crest Hill IL 60435	IEPA DOCS

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Braun, Dr
Location Addr 3: 2312 Plainfield Rd
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.56338
Site ID:	170000337785	Longitude Measure:	-88.13847
System ID:	1970255031	Point X:	-88.13846999999998
Collection Dt:	12/30/2003	Point Y:	41.563380000000005
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

5	1 of 6	W	0.21 / 1,135.09	625.94 / -2	Amoco Oil Co. #15795 Rt. 30 & Caton Farm Rd. Crest Hill IL 60435	LUST
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Incident No:	921518	LPC No:	1970255015
Incidents ID:	13250	IEMA Date:	06/05/1992
NFR Date:	04/10/2000	Regulation:	731
Gasoline:	True	C 20 Day Report Date:	07/21/1992
Unleaded:	False	C 45 Day Report Date:	07/20/1992
Diesel:	False	NFR Recorded Date:	09/05/2000
Fuel Oil:	False	Pre 74 Date:	
Jet Fuel:	False	Proj Manager Phone:	
Used Oil:	False	Proj Mngr First Nm:	Mohammed
Non Petroleum Prod:	False	Proj Mngr Last Nm:	Rahman
Other Petroleum:	False	Proj Manager Email:	
Non LUST Date:		Site County:	Will
Non LUST Letter Dt:			
Heating Oil Letter Date:			
Free Product Discovery Date:			
Primary Resp Party Name:	Amoco Oil Co.		
Primary Resp Party Address:	28100 Torch Pkwy., 6-S		
Primary Resp Party City:	Warrenville		
Primary Resp Party State:	IL		
Primary Resp Party ZIP:	60555		
Primary Resp Party Phone:			
Primary Resp Party Contact:	Lyle Bruce		

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
5	2 of 6	W	0.21 / 1,135.09	625.94 / -2	AAA COOPER TRANSPORT RTE 30 & CATON FARM RD-A CREST HILL IL 60435	FINDS/FRS
Registry ID: 110018408267 FIPS Code: 17197 HUC Code: 07120004 Site Type Name: STATIONARY Location Description: Supplemental Location: Create Date: 19-OCT-04 Update Date: 17-FEB-10 Interest Types: STATE MASTER SIC Codes: SIC Code Descriptions: NAICS Codes: NAICS Code Descriptions: Conveyor: ACES Federal Facility Code: Federal Agency Name: Tribal Land Code: Tribal Land Name: Congressional Dist No: 11 Census Block Code: 171978804122000 EPA Region Code: 05 County Name: WILL US/Mexico Border Ind: Latitude: 41.565762 Longitude: -88.142366 Reference Point: Coord Collection Method: Accuracy Value: Datum: NAD83 Source: Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110018408267 Data Source: Facility Registry Service - Single File Program Acronyms:						

5	3 of 6	W	0.21 / 1,135.09	625.94 / -2	AMOCO 15795 RTE 30 & CATON FARM RD-B CREST HILL IL 60435	FINDS/FRS
Registry ID: 110018151319 FIPS Code: 17197 HUC Code: 07120004 Site Type Name: STATIONARY Location Description: Supplemental Location: Create Date: 19-OCT-04						

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Update Date:		26-JAN-12				
Interest Types:		STATE MASTER, UNSPECIFIED UNIVERSE				
SIC Codes:						
SIC Code Descriptions:						
NAICS Codes:						
NAICS Code Descriptions:						
Conveyor:		ACES				
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:		13				
Census Block Code:		171978809011057				
EPA Region Code:		05				
County Name:		WILL				
US/Mexico Border Ind:						
Latitude:		41.56542				
Longitude:		-88.14177				
Reference Point:						
Coord Collection Method:						
Accuracy Value:						
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110018151319				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						

5	4 of 6	W	0.21 / 1,135.09	625.94 / -2	AMOCO OIL COMPANY RT. 30 & CATON FARM RD. CRESTHILL IL	SPILLS
Incident No:	921518			County:	WILL	
Date/Time Occurred:	6/5/1992 9:05:00 AM			Latitude:		
Media Release:				Longutude:		
Facility Manager:						
Fac Manager Phone:						
Responsible Party Street:						
Area Involved:	FIXED FACILITY					
Milepost:						
Section:						
Township:						
Range:						

Hazardous Materials Incident Report

Incident Report Dt:	6/5/1992 9:05:00 AM	County:	WILL
Data Input Status:	CLOSED	Entered by:	
LUST?:		Date Entered:	
Hazmat Incident Type:	LEAK		

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Caller:	JANA LANGNICKEL
Caller Represents:	AMOCO OIL COMPANY
Street Address:	RT. 30 & CATON FARM RD.
City:	CRESTHILL
URL:	https://public.iema.state.il.us/FOIAHazmatSearch/HazmatDetails.aspx?RptNum=921518
Narrative:	

Follow Up Information:

Materials Involved

Name:	GASOLINE
Type:	UNKNOWN
CHRIS CODE:	
CAS No:	
UN/NA No:	
Container Type:	UNDERGROUND TANK
Container Size:	UNDERGROUND TANK
Amount Released:	
Rate of Release Min:	
Duration of Release:	
Cause of Release:	
Est Spill Extent:	
Spill Extent Units:	
Date/Time Inc Occur:	
Unknown Occurr:	
Date/Time Discov:	06/04/92 1300
Unknown Discovered:	
Where Taken:	
On Scene Contact:	
No of People Evacuat:	
A 302(a) Extremely Haz Sub?:	
A RCRA Hazardous Waste?:	
A RCRA Regulated Facility?:	
Public Health Risks:	
State Agency Assistance:	
Containment/Cleanup Plans:	

5	5 of 6	W	0.21 / 1,135.09	625.94 / -2	Amoco 15795 Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	LUST DOCUMENT
Site ID (Map):	170000376028	Originating Bureau (Web):	Bureau of Land			
System ID (Map):	1970255015	City (Web):	Crest Hill			
Program ID (Web):	1970255015	State (Web):	IL			
Interest Type (Map):	LUST	Zip (Web):	60435			
Media Code (Map):	LAND	City (Map):	Crest Hill			
Category (Web):	Leaking UST Technical	State (Map):	IL			
Document Indicator (Map):	Yes	Zip (Map):	60435			

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Document Count (Web):	3				Latitude (Map):	41.56542
Total Pages (Web):	5				Longitude (Map):	-88.14177
Revision Date Time (Map):	06/30/2003				X (Map):	-88.14176999999995
Collection Date (Map):	01/01/2001				Y (Map):	41.565420000000074
Name (Web):	Amoco - 170000376028					
Address (Web):	Rte 30 & Caton Farm Rd					
Name (Map):	Amoco 15795					
Address (Map):	Rte 30 & Caton Farm Rd-b					
Category URL (Web):	https://docuware67.illinois.gov/DocuWare/PlatformRO/WebClient/3/Integration?lc=VXNlcj1kd3B1YmtpY1xuUHdkPU4xbWRhJHRyYXRvcIBANTU1&p=RLV&rl=ce728c9a-11c1-4ddf-9003-314169ab1943&tw=Results&q=W0lFUEFJRf09ljE3MDAwMDM3NjAyOCIgQU5EIFtDQVRFR09SWV09IjxQSI1IEPA Source Water Assessment Program (SWAP) & Mapping Tool (Map); IEPA Document Explorer - Facility/Site Search (Web)					
Data Source:	IEPA Source Water Assessment Program (SWAP) & Mapping Tool (Map); IEPA Document Explorer - Facility/Site Search (Web)					
Note:	Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer					

<u>5</u>	6 of 6	W	0.21 / 1,135.09	625.94 / -2	Amoco 15795 Rte 30 & Caton Farm Rd-b Crest Hill IL 60435	IEPA DOCS
Note:	Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer					

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Amoco 15795
Location Addr 3: Rte 30 & Caton Farm Rd-b
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	Yes	Latitude Measure:	41.56542
Site ID:	170000376028	Longitude Measure:	-88.14177
System ID:	1970255015	Point X:	-88.14176999999995
Collection Dt:	11/07/2002	Point Y:	41.565420000000074
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

<u>6</u>	1 of 1	W	0.22 / 1,135.21	625.94 / -2	AMOCO 15795 RT 30 AND CATON FARM CREST HILL IL 60435	RCRA NON GEN
EPA Handler ID:	ILD984886655					
Gen Status Universe:	No Report					
Contact Name:						
Contact Address:						
Contact Phone No and Ext:						

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Contact Email:

Contact Country:

County Name: WILL

EPA Region: 05

Land Type: Private

Receive Date: 20191213

Location Latitude:

Location Longitude:

Recycler Activity?: NO

Recycler Activity Note: This facility has no indication of Recycling Activity.

Violation/Evaluation Summary

Note: NO RECORDS: As of Oct 2024, there are no Compliance Monitoring and Enforcement (violation) records associated with this facility (EPA ID).

Handler Summary

Importer Activity: No

Mixed Waste Generator: No

Transporter Activity: No

Transfer Facility: No

Onsite Burner Exemption: No

Furnace Exemption: No

Underground Injection Activity: No

Commercial TSD: No

Used Oil Transporter: No

Used Oil Transfer Facility: No

Used Oil Processor: No

Used Oil Refiner: No

Used Oil Burner: No

Used Oil Market Burner: No

Used Oil Spec Marketer: No

Recycler Activity: No

Recycler Activity Without Storage: No

Hazardous Waste Handler Details

Sequence No: 1

Receive Date: 19920526

Handler Name: AMOCO 15795

Source Type: Notification

Federal Waste Generator Code: 2

Generator Code Description: Small Quantity Generator

Waste Code Details

Hazardous Waste Code: D001

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Waste Code Description: IGNITABLE WASTE

Hazardous Waste Handler Details

Sequence No: 1
 Receive Date: 20191213
 Handler Name: AMOCO 15795
 Source Type: Implementer
 Federal Waste Generator Code: N
 Generator Code Description: Not a Generator, Verified

Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	2021 SPRING RD STE 400
Name:	AMOCO OIL CO	Street 2:	
Date Became Current:		City:	OAK BROOK
Date Ended Current:		State:	IL
Phone:	708-990-5722	Country:	
Source Type:	Notification	Zip Code:	60521

Historical Handler Details

Receive Dt: 19920526
 Generator Code Description: Small Quantity Generator
 Handler Name: AMOCO 15795

7	1 of 8	W	0.24 / 1,271.16	626.32 / -1	Reichart, Sam 2400 Plainfield Rd. Crest Hill IL 60435	LUST
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Incident No:	990738	LPC No:	1970255014
Incidents ID:	23449	IEMA Date:	03/27/1999
NFR Date:	10/17/2005	Regulation:	732
Gasoline:	True	C 20 Day Report Date:	06/21/1999
Unleaded:	False	C 45 Day Report Date:	06/21/1999
Diesel:	False	NFR Recorded Date:	09/28/2007
Fuel Oil:	False	Pre 74 Date:	
Jet Fuel:	False	Proj Manager Phone:	
Used Oil:	True	Proj Mngr First Nm:	Chris
Non Petroleum Prod:	False	Proj Mngr Last Nm:	Covert
Other Petroleum:	False	Proj Manager Email:	
Non LUST Date:		Site County:	Will
Non LUST Letter Dt:			
Heating Oil Letter Date:			
Free Product Discovery Date:			
Primary Resp Party Name:	Sam Reichart		
Primary Resp Party Address:	15060 Budler Road		
Primary Resp Party City:	Plainfield		
Primary Resp Party State:	IL		

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Primary Resp Party ZIP: 60544 Primary Resp Party Phone: 8154367481 Primary Resp Party Contact:						
7	2 of 8	W	0.24 / 1,271.16	626.32 / -1	Reichert, Sam 2400 Plainfield Rd. Crest Hill IL 60435	LUST
Incident No: 891281 Incidents ID: 6562 NFR Date: 10/17/2005 Gasoline: True Unleaded: False Diesel: False Fuel Oil: False Jet Fuel: False Used Oil: False Non Petroleum Prod: False Other Petroleum: False Non LUST Date: Non LUST Letter Dt: Heating Oil Letter Date: Free Product Discovery Date: Primary Resp Party Name: Sam's Service Station Primary Resp Party Address: 125 Joliet Rd. Primary Resp Party City: Plainfield Primary Resp Party State: IL Primary Resp Party ZIP: 60441 Primary Resp Party Phone: Primary Resp Party Contact: Sam Reichert						
LPC No: 1970255014 IEMA Date: 07/19/1989 Regulation: 732 C 20 Day Report Date: C 45 Day Report Date: NFR Recorded Date: 09/28/2007 Pre 74 Date: Proj Manager Phone: Proj Mngr First Nm: Chris Proj Mngr Last Nm: Covert Proj Manager Email: Site County: Will						
7	3 of 8	W	0.24 / 1,271.16	626.32 / -1	Swansons Service Center 2400 Plainfield Rd Crest Hill, IL 60435 Crest Hill IL	UST
Facility No: 2025854 Facility Status: Closed Fac Details Status: Closed Fac Type Fac Details: Other Owner Name: Sam Reichert Facility URL: http://webapps.sfm.illinois.gov/ustsearch/Facility.aspx?ID=2025854 Permit History Link: https://webapps.sfm.illinois.gov/USTPortal/Permit/FacilityPermitList/2025854						
Facility Type: Other Owner Type: Owner Status: Current Owner County: Will						
<u>Tank Information</u>						
Tank No: 3 UI No: Status: Removed Removed Date: 7/19/1989						
Capacity: 4000 Petroleum Use: Product: Gasoline CERCLA Substance:						

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Install Date:	1/1/1965			Current Age:	24	
Abandoned Date:				Abandoned Material:		
Last Used Date:	6/1/1980			Product Date:		
Red Tag Issue Date:				Fee Due:	\$0.00	
CAS Code:				Regulated Status:	Federal	
OSFM First Noti Dt:	6/12/1989					
<u>Tank Information</u>						
Tank No:	4			Capacity:	8000	
UI No:				Petroleum Use:		
Status:	Removed			Product:	Gasoline	
Removed Date:	3/26/1999			CERCLA Substance:		
Install Date:	1/1/1970			Current Age:	29	
Abandoned Date:				Abandoned Material:		
Last Used Date:	5/1/1980			Product Date:		
Red Tag Issue Date:				Fee Due:	\$0.00	
CAS Code:				Regulated Status:	Federal	
OSFM First Noti Dt:	6/12/1989					
<u>Tank Information</u>						
Tank No:	1			Capacity:	6000	
UI No:				Petroleum Use:		
Status:	Removed			Product:	Gasoline	
Removed Date:	7/19/1989			CERCLA Substance:		
Install Date:	1/1/1965			Current Age:	24	
Abandoned Date:				Abandoned Material:		
Last Used Date:	6/1/1980			Product Date:		
Red Tag Issue Date:				Fee Due:	\$0.00	
CAS Code:				Regulated Status:	Federal	
OSFM First Noti Dt:	6/12/1989					
<u>Tank Information</u>						
Tank No:	5			Capacity:	500	
UI No:				Petroleum Use:		
Status:	Removed			Product:	Used Oil	
Removed Date:	3/26/1999			CERCLA Substance:		
Install Date:	1/1/1965			Current Age:	34	
Abandoned Date:				Abandoned Material:		
Last Used Date:				Product Date:		
Red Tag Issue Date:				Fee Due:	\$0.00	
CAS Code:				Regulated Status:	Federal	
OSFM First Noti Dt:	1/26/1999					

Tank Information

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Tank No:	6				Capacity:	500
UI No:					Petroleum Use:	
Status:	Removed				Product:	Used Oil
Removed Date:	3/26/1999				CERCLA Substance:	
Install Date:	1/1/1980				Current Age:	19
Abandoned Date:					Abandoned Material:	
Last Used Date:					Product Date:	
Red Tag Issue Date:					Fee Due:	\$0.00
CAS Code:					Regulated Status:	Federal
OSFM First Noti Dt:	4/12/1999					

Tank Information

Tank No:	2				Capacity:	6000
UI No:					Petroleum Use:	
Status:	Removed				Product:	Gasoline
Removed Date:	7/19/1989				CERCLA Substance:	
Install Date:	1/1/1965				Current Age:	24
Abandoned Date:					Abandoned Material:	
Last Used Date:	6/1/1980				Product Date:	
Red Tag Issue Date:					Fee Due:	\$0.00
CAS Code:					Regulated Status:	Federal
OSFM First Noti Dt:	6/12/1989					

Owner Summary

Owner No:	U0012593				Owner Status:	Current Owner
Owner Name:	Reichert, Sam				Purchase Date:	
Ownership History:	https://webapps.sfm.illinois.gov/ustsearch/Ownership.aspx?ID=2025854					

LUST Fund Eligibility

IEMA No:	99-0738				OSFM Received Dt:	4/19/2000
Status:	Eligible				OSFM Response Dt:	5/4/2000
Deductible:	\$15,000					
Letter:						
IEMA Link:	https://public.iema.state.il.us/FOIAHazmatSearch/HazmatDetails.aspx					

Facility Details

MFD Forms Status:					Green Tag Decal:	
MFD Permit Issue Dt:					Green Tag Issue Date:	
MFD Permit Exp Dt:					Green Tag Exp Date:	
Property Parcel:					Motor Fuel Type:	
Pending Nov:	No					
Status:	Closed					
Permit History Link:	https://webapps.sfm.illinois.gov/USTPortal/Permit/FacilityPermitList/2025854					

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
<u>Motorfuel Dispensing Permit</u>						
Status:		No Forms Found				
Letter:						
MFD Received Date:						
MFD Name:						
MFD City:						
7	4 of 8	W	0.24 / 1,271.16	626.32 / -1	SAMS SVC STATION 2400 PLAINFIELD RD CREST HILL IL 60435	FINDS/FRS
Registry ID:		110018408329				
FIPS Code:		17197				
HUC Code:		07120004				
Site Type Name:		STATIONARY				
Location Description:						
Supplemental Location:						
Create Date:		19-OCT-04				
Update Date:		29-DEC-14				
Interest Types:		STATE MASTER				
SIC Codes:						
SIC Code Descriptions:						
NAICS Codes:						
NAICS Code Descriptions:						
Conveyor:		FRS-GEOCODE				
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:		11				
Census Block Code:		171978804151113				
EPA Region Code:		05				
County Name:		WILL				
US/Mexico Border Ind:						
Latitude:		41.56609				
Longitude:		-88.14277				
Reference Point:		ENTRANCE POINT OF A FACILITY OR STATION				
Coord Collection Method:		ADDRESS MATCHING-HOUSE NUMBER				
Accuracy Value:		50				
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110018408329				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						
7	5 of 8	W	0.24 / 1,271.16	626.32 / -1	SAMES SERVICE STATION 2400 Plainfield Road CREST HILL IL	SPILLS

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Incident No:	891281				County:	WILL
Date/Time Occurred:	7/19/1989 9:13:00 AM				Latitude:	
Media Release:					Longitude:	
Facility Manager:						
Fac Manager Phone:						
Responsible Party Street:	125 JOLIET ROAD PLAINFIELD,IL 60441					
Area Involved:						
Milepost:						
Section:						
Township:						
Range:						

Hazardous Materials Incident Report

Incident Report Dt:	7/19/1989 9:13:00 AM	County:	WILL
Data Input Status:	CLOSED	Entered by:	
LUST?:		Date Entered:	
Hazmat Incident Type:	LEAK		
Caller:	JACK QUINN		
Caller Represents:	STATE FIRE MARSHAL		
Street Address:	2400 Plainfield Road		
City:	CREST HILL		
URL:	https://public.iema.state.il.us/FOIAHazmatSearch/HazmatDetails.aspx?RptNum=891281		
Narrative:			

Follow Up Information:

Materials Involved

Name:	GASOLINE
Type:	UNKNOWN
CHRIS CODE:	
CAS No:	
UN/NA No:	
Container Type:	UNDERGROUND TANK
Container Size:	UNDERGROUND TANK
Amount Released:	
Rate of Release Min:	
Duration of Release:	
Cause of Release:	OVERFILLS
Est Spill Extent:	
Spill Extent Units:	
Date/Time Inc Occur:	
Unknown Occur:	
Date/Time Discov:	07/19/89 0900
Unknown Discovered:	
Where Taken:	NONE
On Scene Contact:	
No of People Evacuat:	NONE

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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A 302(a) Extremely Haz Sub?:
A RCRA Hazardous Waste?:
A RCRA Regulated Facility?:
Public Health Risks:
State Agency Assistance:
Containment/Cleanup Plans: UNKNOWN AT THIS TIME

Agency or Persons Notified

Agency: STATE FIRE MARSHAL
Date/Time:
Name of Person:
Notification Action: Contacted

7	6 of 8	W	0.24 / 1,271.16	626.32 / -1	SAM REICHART 2400 PLAINFIELD ROAD CREST HILLS IL	SPILLS
Incident No: 990738						
Date/Time Occurred: 3/27/1999 11:55:00 AM				County: WILL		
Media Release:				Latitude:		
Facility Manager:				Longutude:		
Fac Manager Phone:						
Responsible Party Street:						
Area Involved:		FIXED FACILITY				
Milepost:						
Section:						
Township:						
Range:						

Hazardous Materials Incident Report

Incident Report Dt: 3/27/1999 11:55:00 AM
County: WILL

Data Input Status: CLOSED
Entered by:

LUST?:
Date Entered:

Hazmat Incident Type: LEAK

Caller: JEFF WARD

Caller Represents: WARD ENVIRONMENTAL ENGINE

Street Address: 2400 PLAINFIELD ROAD

City: CREST HILLS

URL: https://public.iema.state.il.us/FOIAHazmatSearch/HazmatDetails.aspx?RptNum=990738

Narrative:

Follow Up Information:

Materials Involved

Name: GASOLINE AND USED OIL

Type: UNKNOWN

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
CHRIS CODE:						
CAS No:						
UN/NA No:						
Container Type:		UNDERGROUND TANK				
Container Size:		UNDERGROUND TANK				
Amount Released:		UNKNOWN				
Rate of Release Min:						
Duration of Release:						
Cause of Release:		SPILL AND OVERFILL				
Est Spill Extent:						
Spill Extent Units:						
Date/Time Inc Occur:						
Unknown Occurr:						
Date/Time Discov:		03/26/99 1200				
Unknown Discovered:						
Where Taken:		-0-				
On Scene Contact:						
No of People Evacuat:		-0-				
A 302(a) Extremely Haz Sub?:						
A RCRA Hazardous Waste?:						
A RCRA Regulated Facility?:						
Public Health Risks:		NONE				
State Agency Assistance:						
Containment/Cleanup Plans:						

7	7 of 8	W	0.24 / 1,271.16	626.32 / -1	Sams Svc Station 2400 Plainfield Rd Crest Hill IL 60435	LUST DOCUMENT
Site ID (Map):		170000803735		Originating Bureau (Web):		Bureau of Land
System ID (Map):		1970255014		City (Web):		Crest Hill
Program ID (Web):		1970255014		State (Web):		IL
Interest Type (Map):		LUST		Zip (Web):		60435
Media Code (Map):		LAND		City (Map):		Crest Hill
Category (Web):		Leaking UST Technical		State (Map):		IL
Document Indicator (Map):		Yes		Zip (Map):		60435
Document Count (Web):		38		Latitude (Map):		41.56545
Total Pages (Web):		751		Longitude (Map):		-88.14202
Revision Date Time (Map):		06/30/2003		X (Map):		-88.14201999999995
Collection Date (Map):		01/01/2001		Y (Map):		41.565450000000055
Name (Web):		Sams Svc Station - 170000803735				
Address (Web):		2400 Plainfield Rd				
Name (Map):		Sams Svc Station				
Address (Map):		2400 Plainfield Rd				
Category URL (Web):		https://docuware67.illinois.gov/DocuWare/PlatformRO/WebClient/3/Integration?lc=VXNlcj1kd3B1Ym9pY1xuUHdkPU4xbWRhJHRyYXRvcIBANTU1&p=RLV&rl=ce728c9a-11c1-4ddf-9003-314169ab1943&tw=Results&q=W0lFUEFJRf09IjE3MDAwMDgwMzczNSlgQU5EIFtDQVRFR09SWV09IjlxQSI1IEPA Source Water Assessment Program (SWAP) & Mapping Tool (Map); IEPA Document Explorer - Facility/Site Search (Web)				
Data Source:		Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer				
Note:		Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
7	8 of 8	W	0.24 / 1,271.16	626.32 / -1	Sams Svc Station 2400 Plainfield Rd Crest Hill IL 60435	IEPA DOCS

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Sams Svc Station
Location Addr 3: 2400 Plainfield Rd
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	Yes	Latitude Measure:	41.56545
Site ID:	170000803735	Longitude Measure:	-88.14202
System ID:	1970255014	Point X:	-88.14201999999995
Collection Dt:	08/01/2001	Point Y:	41.5654500000000055
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

Unplottable Summary

Total: 6 Unplottable sites

DB	Company Name/Site Name	Address	City	Zip	ERIS ID
AFS	H P D INC	CATON FARM RD	CREST HILL IL	60435	898831760
FINDS/FRS	CREST ESTATES 1ST ADDN	GAYLORD RD	CREST HILL IL	60435	825512273
FINDS/FRS	NICOR GAS-STATION 21A	RTE 53 & CATON FARM RD-B	CREST HILL IL	60403	825511981
FINDS/FRS	PARKROSE STREET WATER MAIN REPLACEMENT AND ROAD RECONSTRUCTION	PARKROSE ST BETWEEN GAYLORD RD AND SWEETBRIAR AVE	CREST HILL IL	60403	923882172
IEPA DOCS	AAA Cooper Transport	Rte 30 & Caton Farm Rd-a	Crest Hill IL	60435	880855666
SPILLS	CHEM LAWN	Lincoln & Root Streets	CREST HILL IL		822007368

Unplottable Report

Site: H P D INC
CATON FARM RD CREST HILL IL 60435

AFS

Afs ID:	1719700342	Fed Reportable:	No
Plant ID:	760036	Current Hpv:	
Epa Region:	05	Loc Contrl Region:	
Plant County:	Will	Afs Gov Fac Code:	0
State No:	17	Operating Status:	X
Primary Sic Code:	9999	Epa Class Code:	B
Secondary Sic Code:		Epa Complian Stat:	0
Naics Code:	339999	State Comp Status:	0
Afs Gov Facility Des:	PRIVATELY OWNED/OPERATED		
Operating Status Def:	Permanently Closed		
Epa Classification Des:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status:	Unknown Compliance Status		
State Compliance Status:	Unknown Compliance Status		

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	6	All Air Prog Codes:	0
Date Achieved:	19900906	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	3	All Air Prog Codes:	0
Date Achieved:	19880920	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	7C
Anu1:	2	All Air Prog Codes:	0
Date Achieved:	19880819	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	

Creation Date:
Key Action No:
Regional Data Element:
National Action Desc: STATE NOV ISSUED
All Air Program Def: 0-SIP Source
Result Def:
Pollutant Def:
All Violating Poll Def:
All Violation Type Def:

Violation Type Cds:

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	1	All Air Prog Codes:	0
Date Achieved:	19880816	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	5	All Air Prog Codes:	0
Date Achieved:	19890328	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Historical Compliance - Air Program Level

Air Program Code: 0
Air Program Code Ref: SIP Source
Historical Compliance Date: 0604, 0701, 0702, 0703, 0704, 0801, 0802, 0803, 0804, 0901, 0902, 0903, 0904, 1001, 1002, 1003, 1004, 1101, 1102, 1103, 1104, 1201, 1202, 1203, 1204, 1301, 1302, 1303, 1304, 1401, 1402, 1403
Historical Compliance Status: 0
Historical Compliance Stat Ref: Unknown Compliance Status

Air Program

Plant ID:	760036	Poll Classificatn:	C
Air Program Code:	0	Poll Compli Status:	0
Air Program Status:	X	Epa Class Code:	B
Pollutant Code:	FACIL	Epa Compli Status:	0
Chemical Abstract Service Nbr:			
Air Program Code Subparts:			
Air Program Code Ref:	SIP Source		
Epa Classification Code Ref:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status Ref:	Unknown Compliance Status		
Pollutant Code Ref:			
Pollutant Classification Ref:	Class is unknown.		

Pollutant Compliance Status Ref: Unknown Compliance Status

Air Program

Plant ID:	760036	Poll Classification:	B
Air Program Code:	0	Poll Compli Status:	0
Air Program Status:	X	Epa Class Code:	B
Pollutant Code:	PT	Epa Compli Status:	0
Chemical Abstract Service Nbr:			
Air Program Code Subparts:			
Air Program Code Ref:	SIP Source		
Epa Classification Code Ref:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status Ref:	Unknown Compliance Status		
Pollutant Code Ref:			
Pollutant Classification Ref:	Potential uncontrolled emissions <100 tons/year		
Pollutant Compliance Status Ref:	Unknown Compliance Status		

Site: CREST ESTATES 1ST ADDN
GAYLORD RD CREST HILL IL 60435

[FINDS/FRS](#)

Registry ID: 110064367064
FIPS Code: 17197
HUC Code:
Site Type Name: STATIONARY
Location Description:
Supplemental Location:
Create Date: 26-MAY-15
Update Date:
Interest Types: STATE MASTER
SIC Codes:
SIC Code Descriptions:
NAICS Codes:
NAICS Code Descriptions:
Conveyor:
Federal Facility Code:
Federal Agency Name:
Tribal Land Code:
Tribal Land Name:
Congressional Dist No:
Census Block Code:
EPA Region Code: 05
County Name: WILL
US/Mexico Border Ind:
Latitude:
Longitude:
Reference Point:
Coord Collection Method:
Accuracy Value:
Datum: NAD83
Source:
Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110064367064
Data Source: Facility Registry Service - Single File
Program Acronyms:

Site: NICOR GAS-STATION 21A
RTE 53 & CATON FARM RD-B CREST HILL IL 60403

[FINDS/FRS](#)

Registry ID: 110062852122
FIPS Code: 17197
HUC Code:
Site Type Name: STATIONARY
Location Description:
Supplemental Location:
Create Date: 18-NOV-14
Update Date:

Interest Types: STATE MASTER
SIC Codes:
SIC Code Descriptions:
NAICS Codes:
NAICS Code Descriptions:
Conveyor:
Federal Facility Code:
Federal Agency Name:
Tribal Land Code:
Tribal Land Name:
Congressional Dist No:
Census Block Code:
EPA Region Code: 05
County Name: WILL
US/Mexico Border Ind:
Latitude:
Longitude:
Reference Point:
Coord Collection Method:
Accuracy Value:
Datum: NAD83
Source:
Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110062852122
Data Source: Facility Registry Service - Single File
Program Acronyms:

Site: PARKROSE STREET WATER MAIN REPLACEMENT AND ROAD RECONSTRUCTION
PARKROSE ST BETWEEN GAYLORD RD AND SWEETBRIAR AVE CREST HILL IL 60403

[FINDS/FRS](#)

Registry ID: 110071671739
FIPS Code:
HUC Code: 07120004
Site Type Name: STATIONARY
Location Description:
Supplemental Location:
Create Date: 12-APR-24
Update Date:
Interest Types: ICIS-NPDES NON-MAJOR, STORM WATER CONSTRUCTION
SIC Codes:
SIC Code Descriptions:
NAICS Codes:
NAICS Code Descriptions:
Conveyor: ICIS
Federal Facility Code:
Federal Agency Name:
Tribal Land Code:
Tribal Land Name:
Congressional Dist No: 13
Census Block Code: 171978809012031
EPA Region Code: 05
County Name:
US/Mexico Border Ind:
Latitude: 41.5622
Longitude: -88.139
Reference Point:
Coord Collection Method: UNKNOWN
Accuracy Value:
Datum: NAD83
Source:
Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110071671739
Data Source: Facility Registry Service - Single File
Program Acronyms:

Site: AAA Cooper Transport
Rte 30 & Caton Farm Rd-a Crest Hill IL 60435

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: AAA Cooper Transport
Location Addr 3: Rte 30 & Caton Farm Rd-a
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.565762
Site ID:	170000803708	Longitude Measure:	-88.142366
System ID:	1970253002	Point X:	-88.14236599999998
Collection Dt:	01/19/2010	Point Y:	41.565762000000006
Revision Dt Time:	01/19/2010		
Interest Type:	BOL		
Media Code:	LAND		

Site: CHEM LAWN
Lincoln & Root Streets CREST HILL IL

SPILLS

Incident No:	890542	County:	WILL
Date/Time Occurred:	04/07/89 1015	Latitude:	
Media Release:		Longitude:	
Facility Manager:			
Fac Manager Phone:			
Responsible Party Street:			
Area Involved:			
Milepost:			
Section:			
Township:			
Range:			

Hazardous Materials Incident Report

Incident Report Dt:	4/7/1989 10:59:00 AM	County:	WILL
Data Input Status:	CLOSED	Entered by:	
LUST?:		Date Entered:	
Hazmat Incident Type:	SPILL		
Caller:	BRENDA JANSEN		
Caller Represents:	WILL COUNTY ESDA		
Street Address:	Lincoln & Root Streets		
City:	CREST HILL		
URL:	https://public.iema.state.il.us/FOIAHazmatSearch/HazmatDetails.aspx?RptNum=890542		
Narrative:			

Follow Up Information:

Materials Involved

Name: PESTICIDE FERTILIZER
Type: UNKNOWN
CHRIS CODE:
CAS No:
UN/NA No:
Container Type: TRUCK
Container Size: TRUCK
Amount Released: 50 GALLONS
Rate of Release Min:
Duration of Release:
Cause of Release: DRIVER ERROR

Est Spill Extent:
Spill Extent Units:
Date/Time Inc Occur: 04/07/89 1015
Unknown Occurr:
Date/Time Discov:
Unknown Discovered:
Where Taken: NONE
On Scene Contact:
No of People Evacuat: NONE
A 302(a) Extremely Haz Sub?:
A RCRA Hazardous Waste?:
A RCRA Regulated Facility?:
Public Health Risks:
State Agency Assistance:
Containment/Cleanup Plans: DIKED AREA

Agency or Persons Notified

Agency: FD.PD.WILL CO. ESDA
Date/Time:
Name of Person:
Notification Action: Contacted

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ERIS updates databases as set out in ASTM Standard E1527-13 and E1527-21, Section 8.1.8 Sources of Standard Source Information:

"Government information from nongovernmental sources may be considered current if the source updates the information at least every 90 days, or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public."

Standard Environmental Record Sources

Federal

National Priority List:

NPL

The U.S. Environmental Protection Agency (EPA)'s National Priorities List (NPL) includes the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program, based primarily on the score a site receives from EPA's Hazard Ranking System. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. This data includes NPL sites represented as polygons, where available, that can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. As site investigation and remediation progress, OUs may be added, modified or refined. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

National Priority List - Proposed:

PROPOSED NPL

Sites proposed by the U.S. Environmental Protection Agency (EPA), the state agency, or concerned citizens for addition to the National Priorities List (NPL) due to contamination by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health and/or the environment. Sites represented as polygons, where available, can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

Deleted NPL:

DELETED NPL

Sites deleted from the U.S. Environmental Protection Agency (EPA)'s National Priorities List (NPL). The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate. Sites represented as polygons, where available, can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

SEMS List 8R Active Site Inventory:[SEMS](#)

The U.S. Environmental Protection Agency's (EPA) Superfund Program has deployed the Superfund Enterprise Management System (SEMS), which integrates multiple legacy systems into a comprehensive tracking and reporting tool. This inventory contains active sites evaluated by the Superfund program that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. This data includes SEMS sites from the List 8R Active file as well as applicable sites from the EPA's Facility Registry Service map tool.

Government Publication Date: Oct 24, 2024

SEMS List 8R Archive Sites:[SEMS ARCHIVE](#)

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. This data includes sites from the List 8R Archived site file.

Government Publication Date: Oct 24, 2024

Inventory of Open Dumps, June 1985:[ODI](#)

The Resource Conservation and Recovery Act (RCRA) provides for publication of an inventory of open dumps. The Act defines "open dumps" as facilities which do not comply with EPA's "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR 257).

Government Publication Date: Jun 1985

Comprehensive Environmental Response, Compensation and Liability Information System -[CERCLIS](#)**CERCLIS:**

Superfund is a program administered by the United States Environmental Protection Agency (EPA) to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The EPA administers the Superfund program in cooperation with individual states and tribal governments; this database is made available by the EPA.

Government Publication Date: Oct 25, 2013

EPA Report on the Status of Open Dumps on Indian Lands:[IODI](#)

Public Law 103-399, The Indian Lands Open Dump Cleanup Act of 1994, enacted October 22, 1994, identified congressional concerns that solid waste open dump sites located on American Indian or Alaska Native (AI/AN) lands threaten the health and safety of residents of those lands and contiguous areas. The purpose of the Act is to identify the location of open dumps on Indian lands, assess the relative health and environment hazards posed by those sites, and provide financial and technical assistance to Indian tribal governments to close such dumps in compliance with Federal standards and regulations or standards promulgated by Indian Tribal governments or Alaska Native entities.

Government Publication Date: Dec 31, 1998

CERCLIS - No Further Remedial Action Planned:[CERCLIS NFRAP](#)

An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. The Archive designation means that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Government Publication Date: Oct 25, 2013

CERCLIS Liens:[CERCLIS LIENS](#)

A Federal Superfund lien exists at any property where EPA has incurred Superfund costs to address contamination ("Superfund site") and has provided notice of liability to the property owner. A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. This database is made available by the United States Environmental Protection Agency (EPA). This database was provided by the United States Environmental Protection Agency (EPA). Refer to SEMS LIEN as the current data source for Superfund Liens.

Government Publication Date: Jan 30, 2014

RCRA CORRACTS-Corrective Action:[RCRA CORRACTS](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. At these sites, the Corrective Action Program ensures that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination, geology, and anticipated use unique to each site.

Government Publication Date: Oct 21, 2024

RCRA non-CORRACTS TSD Facilities:[RCRA TSD](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This database includes Non-Corrective Action sites that have indicated engagement in the treatment, storage, or disposal of hazardous waste which requires a RCRA hazardous waste permit.

Government Publication Date: Oct 21, 2024

RCRA Generator List:[RCRA LQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste.

Government Publication Date: Oct 21, 2024

RCRA Small Quantity Generators List:[RCRA SQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.

Government Publication Date: Oct 21, 2024

RCRA Very Small Quantity Generators List:[RCRA VSQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Very Small Quantity Generators (VSQG) generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.

Government Publication Date: Oct 21, 2024

RCRA Non-Generators:[RCRA NON GEN](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Non-Generators do not presently generate hazardous waste.

Government Publication Date: Oct 21, 2024

RCRA Sites with Controls:[RCRA CONTROLS](#)

List of Resource Conservation and Recovery Act (RCRA) facilities with institutional controls in place. RCRA gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Government Publication Date: Oct 21, 2024

Federal Engineering Controls-ECs:[FED ENG](#)

List of Engineering controls (ECs) made available by the United States Environmental Protection Agency (EPA). ECs encompass a variety of engineered and constructed physical barriers (e.g., soil capping, sub-surface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. The EC listing includes remedy component data from Superfund decision documents for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Nov 20, 2024

Federal Institutional Controls- ICs:

FED INST

List of Institutional controls (ICs) made available by the United States Environmental Protection Agency (EPA). ICs are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site. The IC listing includes remedy component data from Superfund decision documents for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Nov 20, 2024

Land Use Control Information System:

LUCIS

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

Government Publication Date: Sep 1, 2006

Institutional Control Boundaries at NPL sites:

NPL IC

These boundaries of Institutional Control areas at sites on the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL), or as Proposed or Deleted, are sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). The EPA's NPL includes the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes.

Government Publication Date: Sep 25, 2024

Emergency Response Notification System:

ERNS 1982 TO 1986

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1982-1986

Emergency Response Notification System:

ERNS 1987 TO 1989

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1987-1989

Emergency Response Notification System:

ERNS

Database of oil and hazardous substances spill reports made available by the United States Coast Guard National Response Center (NRC). The NRC fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. These data contain initial incident data that has not been validated or investigated by a federal/state response agency.

Government Publication Date: Oct 15, 2024

The Assessment, Cleanup and Redevelopment Exchange System (ACRES) Brownfield Database:

FED BROWNFIELDS

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. This data is provided by the United States Environmental Protection Agency (EPA) and includes Brownfield sites from the Cleanups in My Community (CIMC) web application.

Government Publication Date: Feb 7, 2024

FEMA Underground Storage Tank Listing:

FEMA UST

The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security maintains a list of FEMA owned underground storage tanks.

Government Publication Date: Dec 31, 2017

Facility Response Plan:[FRP](#)

This listing contains facilities that have submitted Facility Response Plans (FRPs) to the U.S. Environmental Protection Agency (EPA). Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit FRPs. Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments. This listing includes FRP facilities from an applicable EPA FOIA file and Homeland Infrastructure Foundation-Level Data (HIFLD) data file.

Government Publication Date: Jan 9, 2024

Delisted Facility Response Plans:[DELISTED FRP](#)

Facilities that once appeared in - and have since been removed from - the list of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Jan 9, 2024

Historical Gas Stations:[HIST GAS STATIONS](#)

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

Government Publication Date: Jul 1, 1930

Petroleum Refineries:[REFN](#)

This list of petroleum refineries is sourced from the U.S. Energy Information Administration (EIA), Refinery Capacity Report. The listing includes operating and idle petroleum refineries (including new refineries under construction) and refineries shut down during the previous year. The geographic area the report covers is the 50 States, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, and other U.S. possessions. Per the EIA, the facility location data represents the approximate location based on research of publicly available information from sources such as Federal agencies, company websites, and satellite images on public websites.

Government Publication Date: Jun 6, 2024

Petroleum Product and Crude Oil Rail Terminals:[BULK TERMINAL](#)

A list of petroleum product and crude oil rail terminals from the U.S. Energy Information Administration (EIA), as well as petroleum terminals sourced from the Federal Communications Commission Data hosted by the Homeland Infrastructure Foundation-Level Database. Data includes operable bulk petroleum product terminals with a total bulk shell storage capacity of 50,000 barrels or more, and/or the ability to receive volumes from tanker, barge, or pipeline; also rail terminals handling the loading and unloading of crude oil with activity between 2017 and 2018. EIA petroleum product terminal data comes from the EIA-815 Bulk Terminal and Blender Report, which includes working, shell in operation, and shell idle for several major product groupings.

Government Publication Date: Jun 6, 2024

LIEN on Property:[SEMS LIEN](#)

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) provides Lien details on applicable properties, such as the Superfund lien on property activity, the lien property information, and the parties associated with the lien.

Government Publication Date: Oct 24, 2024

Superfund Decision Documents:[SUPERFUND ROD](#)

This database contains a list of decision documents for Superfund sites. Decision documents serve to provide the reasoning for the choice of (or) changes to a Superfund Site cleanup plan. The decision documents include completed Records of Decision (ROD), ROD Amendments, Explanations of Significant Differences (ESD) for active and archived sites stored in the Superfund Enterprise Management System (SEMS), along with other associated memos and files. This information is maintained and made available by the U.S. Environmental Protection Agency.

Government Publication Date: Oct 24, 2024

Formerly Utilized Sites Remedial Action Program:[DOE FUSRAP](#)

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

Government Publication Date: Mar 4, 2017

State

State Response Action Program Database:

SSU

The State Response Action Program database identifies the status of all sites under the responsibility of the Illinois EPA's State Sites Unit. The State Response Action Program database made available by Illinois Environmental Protection Agency. This database serves a purpose similar to that of the federal Superfund Enterprise Management System (SEMS), functioning as a state-level counterpart for tracking potential hazardous substance release sites.

Government Publication Date: Aug 3, 2023

Delisted State Response Action Program:

DELISTED SSU

List of sites removed from the State Response Action Program database identifies the status of all sites under the responsibility of the Illinois EPA's State Sites Unit.

Government Publication Date: Aug 3, 2023

Solid Waste Landfills Subject to State Surcharge Database:

SWF/LF

The Bureau of Land maintains a list of solid waste facilities and landfills throughout the state. This list made available by Illinois Environmental Protection Agency's Bureau of land.

Government Publication Date: Jun 24, 2024

Special Waste Site List:

SWF/LF SPECIAL

The following landfills are those that as of January 1, 1990, accept non-hazardous special waste pursuant to the Illinois Environmental Protection Agency Non-Hazardous Special Waste Definition. List A includes landfills that may receive any non-hazardous waste. Non-Regional Pollutant Control Facilities are so noted. List B includes landfills designed to receive specific non-hazardous wastes. List B landfills are designated as a Regional Pollutant Control Facility by RPCF, or Non-regional Pollutant Control Facility by Non-RPCF.

Government Publication Date: Jan 1, 1990

Northeastern Illinois Planning Commission Historical Inventory of Solid Waste Disposal Sites in Northeastern Illinois:

NIPC

Historical inventory of solid waste disposal sites in northeastern Illinois prepared by the Northeastern Illinois Planning Commission (NIPC).

Government Publication Date: Dec 1987

Clean Construction or Demolition Debris:

CCDD

This is a list of CCDD Fill Operations with Approved Permits. Beginning July 1, 2008, no person can use CCDD as fill material in a current or former quarry, mine, or other excavation unless they have obtained a permit from the Illinois EPA.

Government Publication Date: Oct 3, 2023

Leaking Underground Storage Tanks (LUST):

LUST

Leaking underground storage tanks (LUSTs) are a significant source of environmental contamination and may pose threats to human health and safety. The Illinois Office of the State Fire Marshal (OSFM) regulates the daily operation and maintenance of UST systems. When a release occurs, a tank owner, operator, or their designated representative, must notify the Illinois Emergency Management Agency (IEMA), which then notifies the Illinois Environmental Protection Agency (Illinois EPA). The Illinois EPA's LUST Section begins oversight of remedial activities only after the UST release has been reported to the IEMA.

Government Publication Date: Nov 15, 2024

Leaking UST Document:

LUST DOCUMENT

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more of the documents is in the Leaking Underground Storage Tank (LUST) category. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Delisted Leaking Underground Storage Tank Sites:

DELISTED LUST

List of sites removed from the Leaking Underground Storage Tank Incident Tracking (LIT) database made available by the Illinois Environmental Protection Agency.

Government Publication Date: Oct 21, 2024

Underground Storage Tank Fund Payment Priority List:

LUST TRUST

In case sufficient funds are not available in the Underground Storage Tank Fund, requests for payment are entered on the Payment Priority List by "queue date" order. As required by the Environmental Protection Act, the queue date is the date that a complete request for partial or final payment was received by the Agency. The queue date is "officially" confirmed at the end of the payment review process when a Final Decision Letter is sent to the site owner. The Underground Storage Tank Fund Priority list made available by Illinois Environmental Protection Agency.

Government Publication Date: Nov 01, 2016

Underground Storage Tank Database (UST):

UST

This Underground Storage Tank (UST) database is maintained by the Division of Petroleum & Chemical Safety of the Office of the Illinois State Fire Marshal (OSFM). Agency Disclaimer: The data contains information derived from tank registration information supplied to the OSFM from outside sources. This information may not contain complete or current information on a specific tank.

Government Publication Date: Oct 21, 2024

Aboveground Storage Tanks (AST):

AST

A list of aboveground storage tanks inspected by the Office of State Fire Marshal (OSFM).

Government Publication Date: Nov 1, 2024

Delisted Storage Tanks:

DELISTED TANK

This database contains a list of closed storage tank sites that were removed from the Illinois Department of Environmental Quality.

Government Publication Date: Oct 21, 2024

Sites with Engineering Controls:

ENG

Sites in the Illinois Environmental Protection Agency (IEPA)'s Site Remediation Program (SRP) database with engineering controls in place.

Government Publication Date: Nov 22, 2024

Institutional Controls:

INST

Sites in the Illinois Environmental Protection Agency (IEPA)'s Site Remediation Program (SRP) database with institutional controls in place.

Government Publication Date: Nov 22, 2024

Environmental Covenants Registry:

AUL

According to the Illinois Environmental Protection Agency (Illinois EPA), the Illinois Uniform Environmental Covenants Act (UECA) (765 Illinois Compiled Statutes (ILCS) 122 et seq.) creates an environmental covenant that is a specific recordable interest in real estate. It arises from an environmental response project that imposes activity and use limitations on a property. No environmental covenant is effective without the approval of the Illinois EPA, through the Director's signature. The UECA instrument recites the property use controls and remediation requirements imposed upon the property. Section 12(a) of the Illinois UECA requires the Illinois EPA to establish and maintain a registry that contains all environmental covenants and any amendment or termination of those covenants.

Government Publication Date: Aug 8, 2024

Illinois Site Remediation Program Database:

SRP

The Site Remediation Program (SRP) database identifies the status of all voluntary remediation projects administered through the Pre-Notice Site Cleanup Program (1989 to 1995) and the Site Remediation Program (1996 to the present). The SRP database is made available by the Illinois Environmental Protection Agency (IEPA).

Government Publication Date: Nov 22, 2024

Document Explorer Remediation and Assessment Sites:

REM ASSESS

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more documents available are associated with the Federal Facilities Unit, National Priorities List Unit, Site Assessment Unit, or Voluntary Site Remediation Unit. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Brownfields Redevelopment Assessment Database:

BROWNFIELDS

This listing of Brownfields Redevelopment Assessment sites is provided by the Illinois Environmental Protection Agency's (IL EPA) Bureau of Land. Brownfields are abandoned or under-utilized industrial and commercial properties with actual or perceived contamination and an active potential for redevelopment. The IL EPA Remedial Project Management Section (RPMS) manages the Brownfields loan programs and offers technical support to communities through the services of its Brownfields Representatives.

Government Publication Date: Jun 4, 2024

Municipal Brownfields Redevelopment Grant Program (MBRGP) project sites administered through OBA:

[BROWN MBRGP](#)

The Office of Brownfields Assistance (OBA) database identifies the status of all Municipal Brownfields Redevelopment Grant Program (MBRGP) project sites administered through OBA. Office of Brownfields Assistance Database search made available by Illinois Environmental Protection Agency's Bureau of Land Data-Center.

Government Publication Date: Mar 31, 2013

Tribal

Leaking Underground Storage Tanks on Indian Lands:

[INDIAN LUST](#)

This list of leaking underground storage tanks (LUSTs) on Tribal/Indian Lands in Region 5, which includes Illinois, is made available by the United States Environmental Protection Agency (EPA). There are no federally recognized Tribes in Illinois, according to the U.S. Department of Interior, Bureau of Indian Affairs.

Government Publication Date: Oct 16, 2017

Underground Storage Tanks (USTs) on Indian Lands:

[INDIAN UST](#)

This list of underground storage tanks (USTs) on Tribal/Indian Lands in Region 5, which includes Illinois, is made available by the United States Environmental Protection Agency (EPA). There are no federally recognized Tribes in Illinois, according to the U.S. Department of Interior, Bureau of Indian Affairs.

Government Publication Date: Oct 16, 2017

Delisted Tribal Leaking Storage Tanks:

[DELISTED INDIAN LST](#)

Leaking Underground Storage Tank (LUST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian LUST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: May 7, 2024

Delisted Tribal Underground Storage Tanks:

[DELISTED INDIAN UST](#)

Underground Storage Tank (UST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian UST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: May 7, 2024

County

No County databases were selected to be included in the search.

Additional Environmental Record Sources

Federal

PFAS Greenhouse Gas Emissions Data:

[PFAS GHG](#)

The U.S. Environmental Protection Agency's Greenhouse Gas Reporting Program (GHGRP) collects Greenhouse Gas (GHG) data from large emitting facilities (25,000 metric tons of carbon dioxide equivalent (CO₂e) per year), and suppliers of fossil fuels and industrial gases that results in GHG emissions when used. Includes GHG emissions data for facilities that emit or have emitted since 2010 chemicals identified in EPA's CompTox Chemicals Dashboard list of PFAS without explicit structures and list of PFAS structures by DSSTox. PFAS emissions data has been identified for facilities engaged in the following industrial processes: Aluminum Production (GHGRP Subpart F), HCFC-22 Production and HFC-23 Destruction (Subpart O), Electronics Manufacturing (Subpart I), Fluorinated Gas Production (Subpart L), Magnesium Production (Subpart T), Electrical Transmission and Distribution Equipment Use (Subpart DD), and Manufacture of Electric Transmission and Distribution Equipment (Subpart SS). Over time, other industrial processes with required GHGRP reporting may include PFAS emissions data and the list of reportable gases may change over time.

Government Publication Date: Aug 5, 2024

On-Scene Coordinator Response Sites:

[OSC RESPONSE](#)

This list of On-Scene Coordinator (OSC) Response Sites is provided by the U.S. Environmental Protection Agency (EPA). OSCs are the federal officials responsible for monitoring or directing responses to all oil spills and hazardous substance releases reported to the federal government. OSCs coordinate all federal efforts with, and provide support and information to local, state, and regional response communities. An OSC is an agent of either EPA or the U.S. Coast Guard (USCG), depending on where the incident occurs. EPA's OSCs have primary responsibility for spills and releases to inland areas and waters. USCG OSCs have responsibility for coastal waters and the Great Lakes. In general, an OSC has the following key responsibilities during and after a response: Assessment, Monitoring, Response Assistance, and Evaluation.

Government Publication Date: Apr 4, 2024

Facility Registry Service/Facility Index:

[FINDS/FRS](#)

The Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, and data collected from EPA's Central Data Exchange registrations and data management personnel. This list is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Aug 1, 2024

Toxics Release Inventory (TRI) Program:

[TRIS](#)

The U.S. Environmental Protection Agency's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of toxic chemicals from U.S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment. There are currently 770 individually listed chemicals and 33 chemical categories covered by the TRI Program. Facilities that manufacture, process or otherwise use these chemicals in amounts above established levels must submit annual reporting forms for each chemical. Note that the TRI chemical list does not include all toxic chemicals used in the U.S. One of TRI's primary purposes is to inform communities about toxic chemical releases to the environment. This database includes TRI Reporting Data for calendar years 1987 through 2021 and Preliminary Data for 2022.

Government Publication Date: Sep 20, 2023

Hazardous Materials Information Reporting System:

[HMIRS](#)

The Hazardous Materials Incident Reporting System (HMIRS) database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Government Publication Date: May 29, 2024

National Clandestine Drug Labs:

[NCDL](#)

The U.S. Department of Justice ("the Department"), Drug Enforcement Administration (DEA), provides this data as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy.

Government Publication Date: Nov 30, 2023

Toxic Substances Control Act:

[TSCA](#)

The U.S. Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule. The CDR enables EPA to collect and publish information on the manufacturing, processing, and use of commercial chemical substances and mixtures (referred to hereafter as chemical substances) on the TSCA Chemical Substance Inventory (TSCA Inventory). This includes current information on chemical substance production volumes, manufacturing sites, and how the chemical substances are used. This information helps the Agency determine whether people or the environment are potentially exposed to reported chemical substances. EPA publishes submitted CDR data that is not Confidential Business Information (CBI). EPA CDR collections occur approximately every four years and reporting requirements change per collection.

Government Publication Date: May 12, 2022

Hist TSCA:

[HIST TSCA](#)

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The 2006 IUR data summary report includes information about chemicals manufactured or imported in quantities of 25,000 pounds or more at a single site during calendar year 2005. In addition to the basic manufacturing information collected in previous reporting cycles, the 2006 cycle is the first time EPA collected information to characterize exposure during manufacturing, processing and use of organic chemicals. The 2006 cycle also is the first time manufacturers of inorganic chemicals were required to report basic manufacturing information.

Government Publication Date: Dec 31, 2006

FTTS Administrative Case Listing:

[FTTS ADMIN](#)

An administrative case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

FTTS Inspection Case Listing:

[FTTS INSP](#)

An inspection case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

Potentially Responsible Parties List:

[PRP](#)

Early in the site cleanup process, the U.S. Environmental Protection Agency (EPA) conducts a search to find the Potentially Responsible Parties (PRPs). The EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site. This listing contains PRPs, Noticed Parties, at sites in the EPA's Superfund Enterprise Management System (SEMS).

Government Publication Date: Jul 24, 2024

State Coalition for Remediation of Drycleaners Listing:

[SCRD DRYCLEANER](#)

The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998, with support from the U.S. Environmental Protection Agency (EPA) Office of Superfund Remediation and Technology Innovation. Coalition members are states with mandated programs and funding for drycleaner site remediation. Current members are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin. Since 2017, the SCRD no longer maintains this data, refer to applicable state source data where available.

Government Publication Date: Nov 08, 2017

Integrated Compliance Information System (ICIS):

[ICIS](#)

The Integrated Compliance Information System (ICIS) database contains integrated enforcement and compliance information across most of U.S. Environmental Protection Agency's (EPA) programs. The vision for ICIS is to replace EPA's independent databases that contain enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions and a subset of the Permit Compliance System (PCS), which supports the National Pollutant Discharge Elimination System (NPDES). This information is maintained by the EPA Headquarters and at the Regional offices. A future release of ICIS will completely replace PCS and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities that support compliance and enforcement programs, including incident tracking, compliance assistance, and compliance monitoring.

Government Publication Date: Apr 13, 2024

Drycleaner Facilities:

[FED DRYCLEANERS](#)

A list of drycleaner facilities from Enforcement and Compliance History Online (ECHO) data as made available by the U.S. Environmental Protection Agency (EPA), sourced from the ECHO Exporter file. The EPA tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

Government Publication Date: May 5, 2024

Delisted Drycleaner Facilities:

[DELISTED FED DRY](#)

List of sites removed from the list of Drycleaner Facilities (sites in the EPA's Integrated Compliance Information System (ICIS) with NAIC or SIC codes identifying the business as a drycleaner establishment).

Government Publication Date: May 5, 2024

Formerly Used Defense Sites:

[FUDS](#)

Formerly Used Defense Sites (FUDS) are properties that were formerly owned by, leased to, or otherwise possessed by and under the jurisdiction of the Secretary of Defense prior to October 1986, where the Department of Defense (DOD) is responsible for an environmental restoration. The FUDS Annual Report to Congress (ARC) is published by the U.S. Army Corps of Engineers (USACE). This data is compiled from the USACE's Geospatial FUDS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) FUDS dataset which applies to the Fiscal Year 2021 FUDS Inventory.

Government Publication Date: May 15, 2023

FUDS Munitions Response Sites:

[FUDS MRS](#)

Boundaries of Munitions Response Sites (MRS), published with the Formerly Used Defense Sites (FUDS) Annual Report to Congress (ARC) by the U.S. Army Corps of Engineers (USACE). An MRS is a discrete location within a Munitions response area (MRA) that is known to require a munitions response. An MRA means any area on a defense site that is known or suspected to contain unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC). This data is compiled from the USACE's Geospatial MRS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) MRS dataset.

Government Publication Date: May 15, 2023

Former Military Nike Missile Sites:

FORMER NIKE

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

Government Publication Date: Dec 2, 1984**PHMSA Pipeline Safety Flagged Incidents:**

PIPELINE INCIDENT

This list of flagged pipeline incidents is made available by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA regulations require incident and accident reports for five different pipeline system types. Accidents reported on hazardous liquid gravity lines (§195.13) and reporting-regulated-only hazardous liquid gathering lines (§195.15) and incidents reported on Type R gas gathering (§192.8(c)) are not included in the flagged incident file data.

Government Publication Date: May 6, 2024**Material Licensing Tracking System (MLTS):**

MLTS

A list of sites that store radioactive material subject to the Nuclear Regulatory Commission (NRC) licensing requirements. This list is maintained by the NRC. As of September 2016, the NRC no longer releases location information for sites. Site locations were last received in July 2016.

Government Publication Date: May 11, 2021**Historic Material Licensing Tracking System (MLTS) sites:**

HIST MLTS

A historic list of sites that have inactive licenses and/or removed from the Material Licensing Tracking System (MLTS). In some cases, a site is removed from the MLTS when the state becomes an "Agreement State". An Agreement State is a State that has signed an agreement with the Nuclear Regulatory Commission (NRC) authorizing the State to regulate certain uses of radioactive materials within the State.

Government Publication Date: Jan 31, 2010**Mines Master Index File:**

MINES

The Master Index File (MIF) is provided by the United States Department of Labor, Mine Safety and Health Administration (MSHA). This file, which was originally created in the 1970's, contained many Mine-IDs that were invalid. MSHA removes invalid IDs from the MIF upon discovery. MSHA applicable data includes the following: all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970; mine addresses for all mines in the database except for Abandoned mines prior to 1998 from MSHA's legacy system (addresses may or may not correspond with the physical location of the mine itself); violations that have been assessed penalties as a result of MSHA inspections beginning on 1/1/2000; and violations issued as a result of MSHA inspections conducted beginning on 1/1/2000.

Government Publication Date: Feb 5, 2024**Surface Mining Control and Reclamation Act Sites:**

SMCRA

This inventory of land and water impacted by past mining (primarily legacy coal mining operations) is maintained by the U.S. Department of the Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE), as it provides information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). This inventory contains information on the type and extent of Abandoned Mine Land (AML) Problems, as well as information on the cost associated with the reclamation of those problems. The data is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed. Disclaimer: Per the OSMRE, States and tribes who enter their data into e-AMLIS (AML Inventory System) may truncate their latitude and longitude so the precise location of usually dangerous AMLs is not revealed in an effort to protect the public from searching for these AMLs, most of which are on private property. If more precise location information is needed, please contact the applicable state/tribe of interest.

Government Publication Date: May 20, 2024**Mineral Resource Data System:**

MRDS

The Mineral Resource Data System (MRDS) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. The USGS has ceased systematic updates of the MRDS database with their focus more recently on deposits of critical minerals while providing a well-documented baseline of historical mine locations from USGS topographic maps.

Government Publication Date: Mar 15, 2016

DOE Legacy Management Sites:

LM SITES

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) currently manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The LM manages sites with diverse regulatory drivers (statutes or programs that direct cleanup and management requirements at DOE sites) or as part of internal DOE or congressionally-recognized programs, such as but not limited to: Formerly Utilized Sites Remedial Action Program (FUSRAP), Uranium Mill Tailings Radiation Control Act (UMTRCA Title I, Title II), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Decontamination and Decommissioning (D&D), Nuclear Waste Policy Act (NWPA). This site listing includes data exported from the DOE Office of LM's Geospatial Environmental Mapping System (GEMS). GEMS Data disclaimer: The DOE Office of LM makes no representation or warranty, expressed or implied, regarding the use, accuracy, availability, or completeness of the data presented herein.

Government Publication Date: Dec 12, 2023

Alternative Fueling Stations:

ALT FUELS

This list of alternative fueling stations is sourced from the Alternative Fuels Data Center (AFDC). The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy launched the AFDC in 1991 as a repository for alternative fuel vehicle performance data, which provides a wealth of information and data on alternative and renewable fuels, advanced vehicles, fuel-saving strategies, and emerging transportation technologies. The data includes Biodiesel (B20 and above), Compressed Natural Gas (CNG), Electric, Ethanol (E85), Hydrogen, Liquefied Natural Gas (LNG), Propane (LPG), and Renewable Diesel (R20 and above) fuel type locations.

Government Publication Date: Aug 29, 2024

Superfunds Consent Decrees:

CONSENT DECREES

This list of Superfund consent decrees is provided by the Department of Justice, Environment & Natural Resources Division (ENRD) through a Freedom of Information Act (FOIA) applicable file. This listing includes Cases filed since 2010 limited to the following: Consent Decrees for CERCLA or Superfund Sites filed and/or as proposed within the ENRD's Case Management System (CMS); and applicable ENRD's Environmental Defense Section (EDS) CERCLA Cases with "Consent" in History Note. CMS may not reflect the latest developments in a case, nor can the agency guarantee the accuracy of the data. ENRD Disclaimer: Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA; response is limited to those records that are subject to the requirements of the FOIA; however, this should not be taken as an indication that excluded records do, or do not, exist.

Government Publication Date: Jun 26, 2024

Air Facility System:

AFS

This EPA retired Air Facility System (AFS) dataset contains emissions, compliance, and enforcement data on stationary sources of air pollution. Regulated sources cover a wide spectrum; from large industrial facilities to relatively small operations such as dry cleaners. AFS does not contain data on facilities that are solely asbestos demolition and/or renovation contractors, or landfills. ECHO Clean Air Act data from AFS are frozen and reflect data as of October 17, 2014; the EPA retired this system for Clean Air Act stationary sources and transitioned to ICIS-Air.

Government Publication Date: Oct 17, 2014

Registered Pesticide Establishments:

SSTS

This national list of active EPA-registered foreign and domestic pesticide and/or device-producing establishments is based on data from the Section Seven Tracking System (SSTS). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 7 requires that each producing establishment must place its EPA establishment number on the label or immediate container of each pesticide, active ingredient or device produced. An EPA establishment number on a pesticide product label identifies the EPA registered location where the product was produced. The list of establishments is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Feb 29, 2024

Polychlorinated Biphenyl (PCB) Transformers:

PCBT

Locations of Transformers Containing Polychlorinated Biphenyls (PCBs) registered with the United States Environmental Protection Agency. PCB transformer owners must register their transformer(s) with EPA. Although not required, PCB transformer owners who have removed and properly disposed of a registered PCB transformer may notify EPA to have their PCB transformer de-registered. Data made available by EPA.

Government Publication Date: Oct 15, 2019

Polychlorinated Biphenyl (PCB) Notifiers:

PCB

Facilities included in the national list of facilities that have notified the United States Environmental Protection Agency (EPA) of Polychlorinated Biphenyl (PCB) activities. Any company or person storing, transporting or disposing of PCBs or conducting PCB research and development must notify the EPA and receive an identification number.

Government Publication Date: May 23, 2024

Power Plants:

POWER PLANTS

This list of power plants is provided by the U.S. Energy Information Administration (EIA). The listing includes operable electric generating plants in the United States by energy source, originating from the EIA-860, Annual Electric Generator Report; EIA-860M, Monthly Update to the Annual Electric Generator Report; and EIA-923, Power Plant Operations Report. It includes all operable plants by energy source with a combined nameplate capacity of 1 megawatt or more that are operating, are on standby, or out of service for short- or long-term.

Government Publication Date: Apr 15, 2024

State

Spills and Incidents:

[SPILLS](#)

This listing of hazardous materials spill/incident reports is sourced from the Illinois Emergency Management Agency (IEMA)

Government Publication Date: Sep 11, 2024

Emergency Response Releases & Spills Database:

[SPILL OER](#)

The Illinois Environmental Protection Agency's (IEPA) Office of Emergency Response (OER) maintains this Emergency Response Releases & Spills Database. The Emergency Operations Unit (EOU), within OER, coordinates IEPA's response to environmental emergencies involving oil or hazardous materials and ensures that any environmental contamination is cleaned up. EOU works with other response agencies including the Illinois Emergency Management Agency (IEMA), which is the initial contact for responses to an emergency or disaster in Illinois.

Government Publication Date: Sep 11, 2024

Dry Cleaning Facilities:

[DRYCLEANERS](#)

This list of licensed drycleaner facilities is provided by the Drycleaner Environmental Response Trust Fund of Illinois; and since July 1, 2020, is administrated by Illinois Environmental Protection Agency (IEPA).

Government Publication Date: Jul 2, 2024

Delisted Drycleaners:

[DELISTED DRYCLEANERS](#)

List of sites removed from the drycleaners database made available by the Drycleaner Environmental Response Trust Fund of Illinois.

Government Publication Date: Jul 2, 2024

IEPA Document Explorer:

[IEPA DOCS](#)

A list of permits and documents found in the Illinois Environmental Protection Agency (IEPA) Document Explorer. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are available in a digital format. This list includes records not otherwise categorized as LUST, Remediation, Air Permits, NPDES, or Compliance Commitment Agreements.

Government Publication Date: Jul 23, 2024

Clandestine Drug Labs:

[CDL](#)

List of clandestine drug lab locations made available by the Illinois Department of Public Health. The Department maintains a list of properties from reports it receives from the Illinois State Police through the Illinois Emergency Management Agency.

Government Publication Date: Jan 4, 2023

Tier 2 Report:

[TIER 2](#)

List of facilities who submit Tier II forms to the Illinois Emergency Management Agency (IEMA).

Government Publication Date: May 10, 2023

Air Permits:

[AIR PERMITS](#)

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more of the documents is in the Air Permits (construction and operating) category. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Underground Injection Control Wells:

[UIC](#)

The Underground Injection Control (UIC) Program is a federal program established under the provision of the Safe Drinking Water Act of 1974. Since groundwater is a major source of drinking water in the United States, the UIC Program requirements were designed to prevent contamination of groundwater resulting from the operation of injection wells. The Underground Injection Well Inventory is provided by the Illinois Environmental Protection Agency. This inventory includes Class V Injections Wells which are utilized to inject non-hazardous waste into or above the Underground Source of Drinking Water.

Government Publication Date: Aug 1, 2019

Potentially Infectious Medical Waste Facilities:**MEDICAL WASTE**

Title 35 of the Illinois Administrative Code defines Potentially Infectious Medical Waste (PIMW) as waste generated in connection with the diagnosis, treatment (i.e., provision of medical services), or immunization of human beings or animals; research pertaining to the provision of medical services; or the provision or testing of biologicals. The Illinois Environmental Protection Agency's Bureau of Land is responsible for administering the PIMW program. The facilities included on this listing treat, store, transfer or dispose of PIMW.

Government Publication Date: Jun 6, 2023

Compost Facilities:**COMPOST**

The Illinois Environmental Protection Agency's Bureau of Land, Materials Management Unit maintains this list of composting facilities. Composting facilities provide an alternative option to managing and disposing of non-hazardous solid waste and/or landscape waste instead of the waste being landfilled. It is a natural form of recycling that turns some common kinds of household waste, like food and lawn wastes, into a dark organic material that can be used in a variety of beneficial ways.

Government Publication Date: Dec 1, 2023

Tribal

No Tribal additional environmental record sources available for this State.

County

No County additional environmental record sources available for this State.

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.



DATABASE REPORT

Project Property: 41.56655578006289, -88.10435073768302
W
41.56655578006289, -88.10435073768302
Lockport IL 60441

Project No:

Report Type: Screen Report Plus

Order No: 25010300191

Requested by: Bluff City Materials, Inc

Date Completed: January 3, 2025

Environmental Risk Information Services

A division of Glacier Media Inc.

1.866.517.5204 | info@erisinfo.com | erisinfo.com

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Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

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Executive Summary

Property Information:

Project Property: 41.56655578006289, -88.10435073768302W
41.56655578006289, -88.10435073768302 Lockport IL 60441

Project No:

Coordinates:

Latitude: 41.5665558
Longitude: -88.1043507
UTM Northing: 4,602,242.04
UTM Easting: 407,921.57
UTM Zone: 16T

Elevation: 635 FT

Order Information:

Order No: 25010300191
Date Requested: January 3, 2025
Requested by: Bluff City Materials, Inc
Report Type: Screen Report Plus

Historicals/Products:

ERIS Xplorer [ERIS Xplorer](#)
Excel Add-On Excel Add-On

Executive Summary: Report Summary

<i>Database</i>	<i>Searched</i>	<i>Project Property</i>	<i>Within 0.250mi</i>	<i>Total</i>
<u>Standard Environmental Records</u>				
Federal				
NPL	Y	0	0	0
PROPOSED NPL	Y	0	0	0
DELETED NPL	Y	0	0	0
SEMS	Y	0	0	0
ODI	Y	0	0	0
SEMS ARCHIVE	Y	0	0	0
CERCLIS	Y	0	0	0
IODI	Y	0	0	0
CERCLIS NFRAP	Y	0	0	0
CERCLIS LIENS	Y	0	0	0
RCRA CORRACTS	Y	0	0	0
RCRA TSD	Y	0	0	0
RCRA LQG	Y	0	0	0
RCRA SQG	Y	0	0	0
RCRA VSQG	Y	0	3	3
RCRA NON GEN	Y	0	1	1
RCRA CONTROLS	Y	0	0	0
FED ENG	Y	0	0	0
FED INST	Y	0	0	0
LUCIS	Y	0	0	0
NPL IC	Y	0	0	0
ERNS 1982 TO 1986	Y	0	0	0
ERNS 1987 TO 1989	Y	0	0	0
ERNS	Y	0	0	0
FED BROWNFIELDS	Y	0	0	0
FEMA UST	Y	0	0	0

Database	Searched	Project Property	Within 0.250mi	Total
FRP	Y	0	0	0
DELISTED FRP	Y	0	0	0
HIST GAS STATIONS	Y	0	0	0
REFN	Y	0	0	0
BULK TERMINAL	Y	0	0	0
SEMS LIEN	Y	0	0	0
SUPERFUND ROD	Y	0	0	0
DOE FUSRAP	Y	0	0	0

State

SSU	Y	0	0	0
DELISTED SSU	Y	0	0	0
SWF/LF	Y	0	0	0
SWF/LF SPECIAL	Y	0	0	0
NIPC	Y	0	0	0
CCDD	Y	0	0	0
LUST	Y	0	0	0
LUST DOCUMENT	Y	0	0	0
DELISTED LUST	Y	0	0	0
LUST TRUST	Y	0	0	0
UST	Y	0	0	0
AST	Y	0	0	0
DELISTED TANK	Y	0	0	0
ENG	Y	0	0	0
INST	Y	0	0	0
AUL	Y	0	0	0
SRP	Y	0	0	0
REM ASSESS	Y	0	0	0
BROWNFIELDS	Y	0	0	0
BROWN MBRGP	Y	0	0	0

Tribal

INDIAN LUST	Y	0	0	0
INDIAN UST	Y	0	0	0
DELISTED INDIAN LST	Y	0	0	0
DELISTED INDIAN UST	Y	0	0	0

County

No County databases were selected to be included in the search.

Additional Environmental Records

<i>Database</i>	<i>Searched</i>	<i>Project Property</i>	<i>Within 0.250mi</i>	<i>Total</i>
Federal				
PFAS GHG	Y	0	0	0
OSC RESPONSE	Y	0	0	0
FINDS/FRS	Y	0	5	5
TRIS	Y	0	0	0
HMIRS	Y	0	0	0
NCDL	Y	0	0	0
TSCA	Y	0	0	0
HIST TSCA	Y	0	0	0
FTTS ADMIN	Y	0	0	0
FTTS INSP	Y	0	0	0
PRP	Y	0	0	0
SCRD DRYCLEANER	Y	0	0	0
ICIS	Y	0	1	1
FED DRYCLEANERS	Y	0	0	0
DELISTED FED DRY	Y	0	0	0
FUDS	Y	0	0	0
FUDS MRS	Y	0	0	0
FORMER NIKE	Y	0	0	0
PIPELINE INCIDENT	Y	0	0	0
MLTS	Y	0	0	0
HIST MLTS	Y	0	0	0
MINES	Y	0	0	0
SMCRA	Y	0	0	0
MRDS	Y	0	0	0
LM SITES	Y	0	0	0
ALT FUELS	Y	0	0	0
CONSENT DECREES	Y	0	0	0
AFS	Y	0	0	0
SSTS	Y	0	0	0
PCBT	Y	0	0	0
PCB	Y	0	0	0
POWER PLANTS	Y	0	0	0
State				
SPILLS	Y	0	0	0
SPILL OER	Y	0	0	0
DRYCLEANERS	Y	0	0	0
DELISTED DRYCLEANERS	Y	0	0	0
IEPA DOCS	Y	0	3	3
CDL	Y	0	0	0

<i>Database</i>	<i>Searched</i>	<i>Project Property</i>	<i>Within 0.250mi</i>	<i>Total</i>
TIER 2	Y	0	3	3
AIR PERMITS	Y	0	0	0
UIC	Y	0	0	0
MEDICAL WASTE	Y	0	0	0
COMPOST	Y	0	0	0

Tribal *No Tribal additional environmental record sources available for this State.*

County *No County additional environmental record sources available for this State.*

Total:	0	16	16
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Executive Summary: Site Report Summary - Project Property

<i>Map Key</i>	<i>DB</i>	<i>Company/Site Name</i>	<i>Address</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev Diff (ft)</i>	<i>Page Number</i>
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No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	RCRA VSQG	NICOR STATION 183	1075 CATON FARM RD CREST HILL IL 60403	W	0.04 / 199.59	3	17
			EPA Handler ID Recycler Activity?: ILR000206995 NO				
1	FINDS/FRS	NICOR STATION 183	1075 CATON FARM RD CREST HILL IL 60403	W	0.04 / 199.59	3	20
			Registry ID: 110070904693				
2	RCRA VSQG	CHICAGO TRUCK COLLISION	1021B CATON FARM RD LOCKPORT IL 60441	E	0.07 / 376.77	-7	20
			EPA Handler ID Recycler Activity?: ILR000201574 NO				
2	FINDS/FRS	CHICAGO TRUCK COLLISION	1021B CATON FARM RD LOCKPORT IL 60441	E	0.07 / 376.77	-7	22
			Registry ID: 110070558040				
3	RCRA NON GEN	CREST ENVIRONMENTAL	910 SAK DR CRESTHILL IL 60435	SSW	0.22 / 1,149.84	-38	23
			EPA Handler ID Recycler Activity?: IL0000474999 NO				
3	FINDS/FRS	CREST ENV	910 SAK DR CREST HILL IL 60403-2478	SSW	0.22 / 1,149.84	-38	25
			Registry ID: 110005802925				
3	IEPA DOCS	Crest Env	910 Sak Dr Crest Hill IL 60435	SSW	0.22 / 1,149.84	-38	25
3	IEPA DOCS	Richards Leasing & Svc	910 Sak Dr-b Crest Hill IL 60435	SSW	0.22 / 1,149.84	-38	26
4	RCRA VSQG	FIRST STUDENT INC 27041	900 SAK DR JOLIET IL 60435	S	0.23 / 1,229.72	-44	26
			EPA Handler ID Recycler Activity?: ILR000117358 NO				
4	FINDS/FRS	FIRST STUDENT INC	900 SAK DRIVE CREST HILL IL 60403-2478	S	0.23 / 1,229.72	-44	29
			Registry ID: 110006773802				
4	TIER 2	First Student, Inc. #27041	900 Sak Drive Crest Hill IL 60403	S	0.23 / 1,229.72	-44	29
4	IEPA DOCS	First Student Inc	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	-44	44

<i>Map Key</i>	<i>DB</i>	<i>Company/Site Name</i>	<i>Address</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev Diff (ft)</i>	<i>Page Number</i>
<u>4</u>	TIER 2	First Student, Inc. #27041	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	-44	<u>45</u>
<u>4</u>	TIER 2	First Student, Inc. #1758	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	-44	<u>46</u>
<u>5</u>	FINDS/FRS	FIRST STUDENT #27041	900-910 SAK DRIVE CREST HILL IL 60403 <i>Registry ID: 110041918538</i>	S	0.24 / 1,268.11	-43	<u>50</u>
<u>5</u>	ICIS	FIRST STUDENT #27041	900-910 SAK DRIVE CREST HILL IL 60403 <i>Registry ID: 110041918538</i>	S	0.24 / 1,268.11	-43	<u>50</u>

Executive Summary: Summary by Data Source

Standard

Federal

RCRA VSQG - RCRA Very Small Quantity Generators List

A search of the RCRA VSQG database, dated Oct 21, 2024 has found that there are 3 RCRA VSQG site(s) within approximately 0.25 miles of the project property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
NICOR STATION 183	1075 CATON FARM RD CREST HILL IL 60403	W	0.04 / 199.59	1
<i>EPA Handler ID Recycler Activity?: ILR000206995 NO</i>				

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
CHICAGO TRUCK COLLISION	1021B CATON FARM RD LOCKPORT IL 60441	E	0.07 / 376.77	2
<i>EPA Handler ID Recycler Activity?: ILR000201574 NO</i>				
FIRST STUDENT INC 27041	900 SAK DR JOLIET IL 60435	S	0.23 / 1,229.72	4
<i>EPA Handler ID Recycler Activity?: ILR000117358 NO</i>				

RCRA NON GEN - RCRA Non-Generators

A search of the RCRA NON GEN database, dated Oct 21, 2024 has found that there are 1 RCRA NON GEN site(s) within approximately 0.25 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
CREST ENVIRONMENTAL	910 SAK DR CRESTHILL IL 60435	SSW	0.22 / 1,149.84	3
<i>EPA Handler ID Recycler Activity?: IL0000474999 NO</i>				

Non Standard

Federal

FINDS/FRS - Facility Registry Service/Facility Index

A search of the FINDS/FRS database, dated Aug 1, 2024 has found that there are 5 FINDS/FRS site(s) within approximately 0.02 miles of the project property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
NICOR STATION 183	1075 CATON FARM RD CREST HILL IL 60403 <i>Registry ID: 110070904693</i>	W	0.04 / 199.59	<u>1</u>
<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
CHICAGO TRUCK COLLISION	1021B CATON FARM RD LOCKPORT IL 60441 <i>Registry ID: 110070558040</i>	E	0.07 / 376.77	<u>2</u>
CREST ENV	910 SAK DR CREST HILL IL 60403-2478 <i>Registry ID: 110005802925</i>	SSW	0.22 / 1,149.84	<u>3</u>
FIRST STUDENT INC	900 SAK DRIVE CREST HILL IL 60403-2478 <i>Registry ID: 110006773802</i>	S	0.23 / 1,229.72	<u>4</u>
FIRST STUDENT #27041	900-910 SAK DRIVE CREST HILL IL 60403 <i>Registry ID: 110041918538</i>	S	0.24 / 1,268.11	<u>5</u>

ICIS - Integrated Compliance Information System (ICIS)

A search of the ICIS database, dated Apr 13, 2024 has found that there are 1 ICIS site(s) within approximately 0.02 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
FIRST STUDENT #27041	900-910 SAK DRIVE CREST HILL IL 60403 <i>Registry ID: 110041918538</i>	S	0.24 / 1,268.11	<u>5</u>

State

IEPA DOCS - IEPA Document Explorer

A search of the IEPA DOCS database, dated Jul 23, 2024 has found that there are 3 IEPA DOCS site(s) within approximately 0.02 miles of the project property.

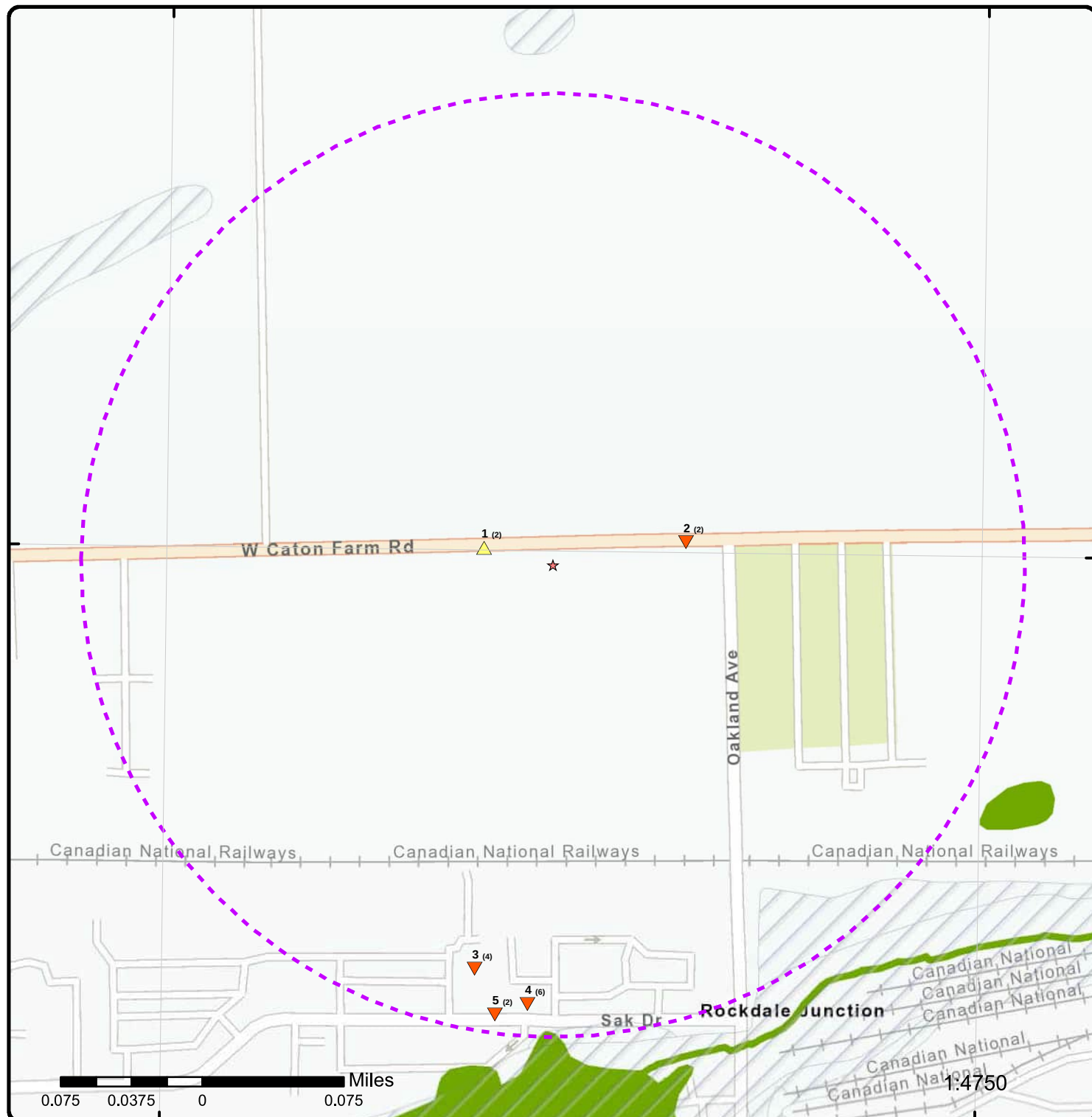
<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
Crest Env	910 Sak Dr Crest Hill IL 60435	SSW	0.22 / 1,149.84	<u>3</u>
Richards Leasing & Svc	910 Sak Dr-b Crest Hill IL 60435	SSW	0.22 / 1,149.84	<u>3</u>

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
First Student Inc	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	<u>4</u>

TIER 2 - Tier 2 Report

A search of the TIER 2 database, dated May 10, 2023 has found that there are 3 TIER 2 site(s) within approximately 0.12 miles of the project property.

<u>Lower Elevation</u>	<u>Address</u>	<u>Direction</u>	<u>Distance (mi/ft)</u>	<u>Map Key</u>
First Student, Inc. #27041	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	<u>4</u>
First Student, Inc. #1758	900 Sak Drive Crest Hill IL 60435	S	0.23 / 1,229.72	<u>4</u>
First Student, Inc. #27041	900 Sak Drive Crest Hill IL 60403	S	0.23 / 1,229.72	<u>4</u>



Map: 0.25 Mile Radius

Order Number: 25010300191

Address: 41.56655578006289, -88.10435073768302, Lockport, IL



★ Project Property

--- Buffer Outline

▲ Sites with Higher Elevation

■ Sites with Same Elevation

▼ Sites with Lower Elevation

○ Sites with Unknown Elevation

■ Areas with Higher Elevation

■ Areas with Same Elevation

■ Areas with Lower Elevation

■ Areas with Unknown Elevation

■ Freeways; Highways

■ Traffic Circle; Ramp

■ Major & Minor Arterial

■ Traffic Circle; Ramp

○ Local Road

— Rail

— State

— Country

■ National Wetland

■ Indian Reserve Land

■ 100 Year Flood Zone

■ 500 Year Flood Zone

■ FWS Special Designation Areas

■ National Priorities List (Active, Delisted, Proposed, Institutional Control)

88°6'30"W

88°6'W

41°34'30"N

41°34'30"N

41°34'N

41°34'N

41°33'30"N

41°33'30"N



0.1 0.05 0 0.1 Miles

1:10000

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Aerial Year: 2023

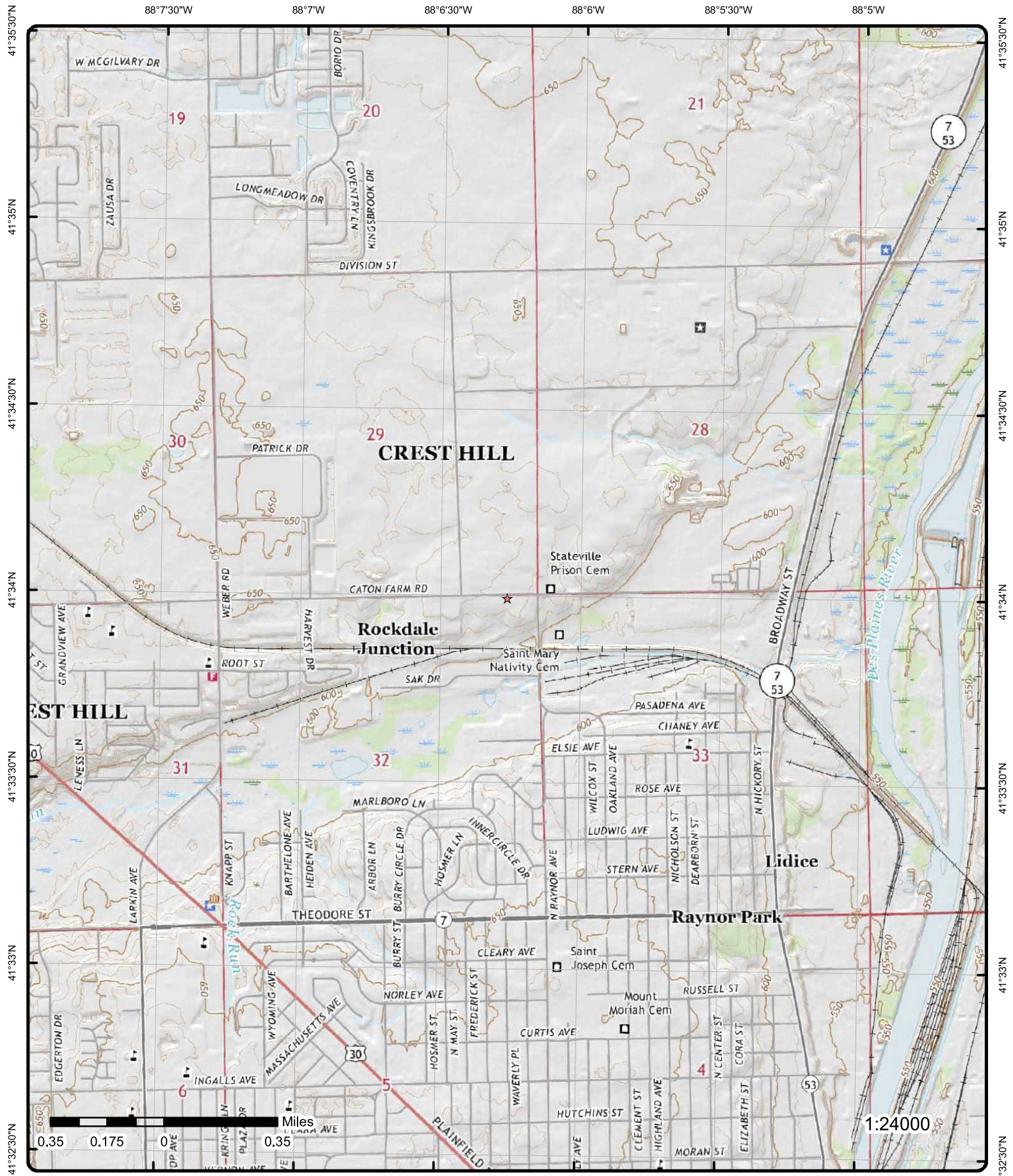
Order Number: 25010300191

Address: 41.56655578006289, -88.10435073768302, Lockport, IL



© ERIS Information Inc.

Source: ESRI World Imagery



Topographic Map Year: 2021 Order Number: 25010300191

Address: 41.56655578006289, -88.10435073768302, IL

Quadrangle(s): Joliet IL

Source: USGS Topographic Map



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Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	1 of 2	W	0.04 / 199.59	638.01 / 3	NICOR STATION 183 1075 CATON FARM RD CREST HILL IL 60403	RCRA VSQG

EPA Handler ID: ILR000206995
Gen Status Universe: VSG
Contact Name: KEITH BODGER
Contact Address: 1844 FERRY RD , , NAPERVILLE , IL, 60563 , US
Contact Phone No and Ext: 630-388-2381
Contact Email: KBODGER@SOUTHERNCO.COM
Contact Country: US
County Name: WILL
EPA Region: 05
Land Type: Private
Receive Date: 20220511
Location Latitude: 41.566549
Location Longitude: -88.108867
Recycler Activity?: NO
Recycler Activity Note: This facility has no indication of Recycling Activity.

Violation/Evaluation Summary

Note: NO RECORDS: As of Oct 2024, there are no Compliance Monitoring and Enforcement (violation) records associated with this facility (EPA ID).

Handler Summary

Importer Activity: No
Mixed Waste Generator: No
Transporter Activity: No
Transfer Facility: No
Onsite Burner Exemption: No
Furnace Exemption: No
Underground Injection Activity: No
Commercial TSD: No
Used Oil Transporter: No
Used Oil Transfer Facility: No
Used Oil Processor: No
Used Oil Refiner: No
Used Oil Burner: No
Used Oil Market Burner: No
Used Oil Spec Marketer: No
Recycler Activity: No
Recycler Act W.O. Storage: No

Hazardous Waste Handler Details

Sequence No: 1
 Receive Date: 20201209
 Handler Name: NICOR STATION 183
 Federal Waste Generator Code: 1
 Generator Code Description: Large Quantity Generator
 Source Type: Notification

Waste Code Details

Hazardous Waste Code: D004
 Waste Code Description: ARSENIC

Hazardous Waste Handler Details

Sequence No: 1
 Receive Date: 20210225
 Handler Name: NICOR STATION 183
 Federal Waste Generator Code: 3
 Generator Code Description: Very Small Quantity Generator
 Source Type: Annual/Biennial Report update with Notification

Waste Code Details

Hazardous Waste Code: D004
 Waste Code Description: ARSENIC

Hazardous Waste Handler Details

Sequence No: 2
 Receive Date: 20220428
 Handler Name: NICOR STATION 183
 Federal Waste Generator Code: 2
 Generator Code Description: Small Quantity Generator
 Source Type: Notification

Waste Code Details

Hazardous Waste Code: D004
 Waste Code Description: ARSENIC

Hazardous Waste Handler Details

Sequence No: 3
 Receive Date: 20220511

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Handler Name: NICOR STATION 183
Federal Waste Generator Code: 3
Generator Code Description: Very Small Quantity Generator
Source Type: Notification

Waste Code Details

Hazardous Waste Code: D004
Waste Code Description: ARSENIC

Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	1844 FERRY RD
Name:	NICOR GAS	Street 2:	
Date Became Current:		City:	NAPERVILLE
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Annual/Biennial Report update with Notification	Zip Code:	60563

Owner/Operator Ind:	Current Operator	Street No:	
Type:	Private	Street 1:	1844 FERRY RD
Name:	NICOR GAS	Street 2:	
Date Became Current:		City:	NAPERVILLE
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Annual/Biennial Report update with Notification	Zip Code:	60563

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	1844 FERRY RD
Name:	NICOR GAS	Street 2:	
Date Became Current:		City:	NAPERVILLE
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Notification	Zip Code:	60563

Owner/Operator Ind:	Current Operator	Street No:	
Type:	Private	Street 1:	1844 FERRY RD
Name:	NICOR GAS	Street 2:	
Date Became Current:		City:	NAPERVILLE
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Notification	Zip Code:	60563

Historical Handler Details

Receive Dt: 20220428
Generator Code Description: Small Quantity Generator
Handler Name: NICOR STATION 183

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Receive Dt: 20210225 Generator Code Description: Very Small Quantity Generator Handler Name: NICOR STATION 183 Receive Dt: 20201209 Generator Code Description: Large Quantity Generator Handler Name: NICOR STATION 183						
1	2 of 2	W	0.04 / 199.59	638.01 / 3	NICOR STATION 183 1075 CATON FARM RD CREST HILL IL 60403	FINDS/FRS
Registry ID: 110070904693 FIPS Code: 17197 HUC Code: 07120004 Site Type Name: STATIONARY Location Description: Supplemental Location: Create Date: 12-FEB-21 Update Date: Interest Types: VSQG SIC Codes: SIC Code Descriptions: NAICS Codes: 221210 NAICS Code Descriptions: NATURAL GAS DISTRIBUTION. Conveyor: FRS-GEOCODE Federal Facility Code: Federal Agency Name: Tribal Land Code: Tribal Land Name: Congressional Dist No: 13 Census Block Code: 171979801001004 EPA Region Code: 05 County Name: WILL US/Mexico Border Ind: Latitude: 41.566707 Longitude: -88.105059 Reference Point: ENTRANCE POINT OF A FACILITY OR STATION Coord Collection Method: ADDRESS MATCHING-HOUSE NUMBER Accuracy Value: 50 Datum: NAD83 Source: Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110070904693 Data Source: Facility Registry Service - Single File Program Acronyms:						
2	1 of 2	E	0.07 / 376.77	628.56 / -7	CHICAGO TRUCK COLLISION 1021B CATON FARM RD LOCKPORT IL 60441	RCRA VSQG

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
EPA Handler ID:		ILR000201574				
Gen Status Universe:		VSG				
Contact Name:		? ?				
Contact Address:						
Contact Phone No and Ext:		708-717-0793				
Contact Email:						
Contact Country:						
County Name:		DU PAGE				
EPA Region:		05				
Land Type:		Private				
Receive Date:		20190430				
Location Latitude:		41.566677				
Location Longitude:		-88.103563				
Recycler Activity?:		NO				
Recycler Activity Note:		This facility has no indication of Recycling Activity.				

Violation/Evaluation Summary

Note: NO RECORDS: As of Oct 2024, there are no Compliance Monitoring and Enforcement (violation) records associated with this facility (EPA ID).

Handler Summary

Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility:	No
Onsite Burner Exemption:	No
Furnace Exemption:	No
Underground Injection Activity:	No
Commercial TSD:	No
Used Oil Transporter:	No
Used Oil Transfer Facility:	No
Used Oil Processor:	No
Used Oil Refiner:	No
Used Oil Burner:	No
Used Oil Market Burner:	No
Used Oil Spec Marketer:	No
Recycler Activity:	No
Recycler Act W.O. Storage:	No

Hazardous Waste Handler Details

Sequence No:	1
Receive Date:	20190430
Handler Name:	CHICAGO TRUCK COLLISION
Federal Waste Generator Code:	3
Generator Code Description:	Very Small Quantity Generator
Source Type:	Notification

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Waste Code Details

Hazardous Waste Code:	D001
Waste Code Description:	IGNITABLE WASTE
Hazardous Waste Code:	F003
Waste Code Description:	THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Hazardous Waste Code:	F005
Waste Code Description:	THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	1021B CATON FARM RD
Name:	CHICAGO TRUCK COLLISION	Street 2:	
Date Became Current:		City:	LOCKPORT
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Notification	Zip Code:	60441
Owner/Operator Ind:	Current Operator	Street No:	
Type:	Private	Street 1:	1021B CATON FARM RD
Name:	CHICAGO TRUCK COLLISION	Street 2:	
Date Became Current:		City:	LOCKPORT
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Notification	Zip Code:	60441

2	2 of 2	E	0.07 / 376.77	628.56 / -7	CHICAGO TRUCK COLLISION 1021B CATON FARM RD LOCKPORT IL 60441	FINDS/FRS
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Registry ID:	110070558040
FIPS Code:	17043
HUC Code:	
Site Type Name:	STATIONARY
Location Description:	
Supplemental Location:	
Create Date:	25-JUN-19
Update Date:	

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Interest Types:		VSQG				
SIC Codes:						
SIC Code Descriptions:						
NAICS Codes:		811111				
NAICS Code Descriptions:		GENERAL AUTOMOTIVE REPAIR.				
Conveyor:						
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:						
Census Block Code:						
EPA Region Code:		05				
County Name:		DU PAGE				
US/Mexico Border Ind:						
Latitude:						
Longitude:						
Reference Point:						
Coord Collection Method:						
Accuracy Value:						
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110070558040				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						

3	1 of 4	SSW	0.22 / 1,149.84	597.48 / -38	CREST ENVIRONMENTAL 910 SAK DR CRESTHILL IL 60435	RCRA NON GEN
EPA Handler ID:		IL0000474999				
Gen Status Universe:		No Report				
Contact Name:		ROBERT PARRY				
Contact Address:		910 SAK DR , , CRESTHILL , IL, 60435 , US				
Contact Phone No and Ext:		815-723-6900				
Contact Email:						
Contact Country:		US				
County Name:		WILL				
EPA Region:		05				
Land Type:		Private				
Receive Date:		19980220				
Location Latitude:		41.563091				
Location Longitude:		-88.105099				
Recycler Activity?:		NO				
Recycler Activity Note:		This facility has no indication of Recycling Activity.				

Violation/Evaluation Summary

Note: NO VIOLATIONS: All of the compliance records associated with this facility (EPA ID) indicate NO VIOLATIONS;

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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Evaluation Details

Evaluation Start Date:	20010801
Evaluation Type Description:	FOCUSED COMPLIANCE INSPECTION
Violation Short Description:	
Return to Compliance Date:	
Evaluation Agency:	State
Evaluation Start Date:	19991014
Evaluation Type Description:	FOCUSED COMPLIANCE INSPECTION
Violation Short Description:	
Return to Compliance Date:	
Evaluation Agency:	State

Handler Summary

Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility:	No
Onsite Burner Exemption:	No
Furnace Exemption:	No
Underground Injection Activity:	No
Commercial TSD:	No
Used Oil Transporter:	Yes
Used Oil Transfer Facility:	Yes
Used Oil Processor:	No
Used Oil Refiner:	No
Used Oil Burner:	No
Used Oil Market Burner:	No
Used Oil Spec Marketer:	No
Recycler Activity:	No
Recycler Activity Without Storage:	No

Hazardous Waste Handler Details

Sequence No:	1
Receive Date:	19980220
Handler Name:	CREST ENVIRONMENTAL
Source Type:	Notification
Federal Waste Generator Code:	N
Generator Code Description:	Not a Generator, Verified

Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	910 SAK DR

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Name: MELKA STEVE Street 2: Date Became Current: City: CRESTHILL Date Ended Current: State: IL Phone: 815-723-6900 Country: Source Type: Notification Zip Code: 60435						
3	2 of 4	SSW	0.22 / 1,149.84	597.48 / -38	CREST ENV 910 SAK DR CREST HILL IL 60403-2478	FINDS/FRS
Registry ID: 110005802925 FIPS Code: 17197 HUC Code: 07120004 Site Type Name: STATIONARY Location Description: Supplemental Location: Create Date: 01-MAR-00 Update Date: 26-JAN-12 Interest Types: STATE MASTER, UNSPECIFIED UNIVERSE SIC Codes: SIC Code Descriptions: NAICS Codes: NAICS Code Descriptions: Conveyor: FRS-GEOCODE Federal Facility Code: Federal Agency Name: Tribal Land Code: Tribal Land Name: Congressional Dist No: 13 Census Block Code: 171978809032003 EPA Region Code: 05 County Name: WILL US/Mexico Border Ind: Latitude: 41.56307 Longitude: -88.1051 Reference Point: CENTER OF A FACILITY OR STATION Coord Collection Method: ADDRESS MATCHING-HOUSE NUMBER Accuracy Value: 30 Datum: NAD83 Source: Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110005802925 Data Source: Facility Registry Service - Single File Program Acronyms:						

3	3 of 4	SSW	0.22 / 1,149.84	597.48 / -38	Crest Env 910 Sak Dr Crest Hill IL 60435	IEPA DOCS
Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer						

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
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IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Crest Env
Location Addr 3: 910 Sak Dr
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.5626
Site ID:	170000202215	Longitude Measure:	-88.10826
System ID:	1970250013	Point X:	-88.10825999999997
Collection Dt:	12/30/2003	Point Y:	41.562600000000003
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

3	4 of 4	SSW	0.22 / 1,149.84	597.48 / -38	Richards Leasing & Svc 910 Sak Dr-b Crest Hill IL 60435	IEPA DOCS
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Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Richards Leasing & Svc
Location Addr 3: 910 Sak Dr-b
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.5626
Site ID:	170000803815	Longitude Measure:	-88.10826
System ID:	1970255036	Point X:	-88.10825999999997
Collection Dt:	07/13/2010	Point Y:	41.562600000000003
Revision Dt Time:	07/13/2010		
Interest Type:	BOL		
Media Code:	LAND		

4	1 of 6	S	0.23 / 1,229.72	591.31 / -44	FIRST STUDENT INC 27041 900 SAK DR JOLIET IL 60435	RCRA VSQG
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EPA Handler ID: ILR000117358
Gen Status Universe: VSG
Contact Name: STEVE NORDVEDT

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Contact Address:		900 SAK DR , , JOLIET , IL, 60435 , US				
Contact Phone No and Ext:		815-724-0078				
Contact Email:		STEVE.NORDVEDT@FIRSTGROUP.COM				
Contact Country:		US				
County Name:		WILL				
EPA Region:		05				
Land Type:		Private				
Receive Date:		20090402				
Location Latitude:		41.563101				
Location Longitude:		-88.104567				
Recycler Activity?:		NO				
Recycler Activity Note:		This facility has no indication of Recycling Activity.				

Violation/Evaluation Summary

Note: NO RECORDS: As of Oct 2024, there are no Compliance Monitoring and Enforcement (violation) records associated with this facility (EPA ID).

Handler Summary

Importer Activity: No
Mixed Waste Generator: No
Transporter Activity: No
Transfer Facility: No
Onsite Burner Exemption: No
Furnace Exemption: No
Underground Injection Activity: No
Commercial TSD: No
Used Oil Transporter: No
Used Oil Transfer Facility: No
Used Oil Processor: No
Used Oil Refiner: No
Used Oil Burner: No
Used Oil Market Burner: No
Used Oil Spec Marketer: No
Recycler Activity: No
Recycler Act W.O. Storage: No

Hazardous Waste Handler Details

Sequence No: 1
Receive Date: 20030115
Handler Name: FIRST STUDENT
Federal Waste Generator Code: 3
Generator Code Description: Very Small Quantity Generator
Source Type: Notification

Hazardous Waste Handler Details

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Sequence No:		2				
Receive Date:		20090402				
Handler Name:		FIRST STUDENT INC 27041				
Federal Waste Generator Code:		3				
Generator Code Description:		Very Small Quantity Generator				
Source Type:		Notification				

Waste Code Details

Hazardous Waste Code:	D001
Waste Code Description:	IGNITABLE WASTE

Owner/Operator Details

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	7950 W 47TH ST
Name:	RUNION EQUIPMENT	Street 2:	
Date Became Current:	20030115	City:	LYONS
Date Ended Current:		State:	IL
Phone:		Country:	US
Source Type:	Notification	Zip Code:	60534

Owner/Operator Ind:	Current Operator	Street No:	
Type:	Private	Street 1:	900 SAK DR
Name:	FIRST STUDENT	Street 2:	
Date Became Current:	20030115	City:	JOLIET
Date Ended Current:		State:	IL
Phone:	815-726-0549	Country:	US
Source Type:	Notification	Zip Code:	60435

Owner/Operator Ind:	Current Owner	Street No:	
Type:	Private	Street 1:	900 SAK DR
Name:	FIRST STUDENT	Street 2:	
Date Became Current:	20030115	City:	JOLIET
Date Ended Current:		State:	IL
Phone:	815-726-0549	Country:	US
Source Type:	Notification	Zip Code:	60435

Owner/Operator Ind:	Current Operator	Street No:	
Type:	Private	Street 1:	900 SAK DR
Name:	FIRST STUDENT INC	Street 2:	
Date Became Current:	20090117	City:	JOLIET
Date Ended Current:		State:	IL
Phone:	815-726-0549	Country:	US
Source Type:	Notification	Zip Code:	60435

Historical Handler Details

Receive Dt:	20030115
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Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Generator Code Description:		Very Small Quantity Generator				
Handler Name:		FIRST STUDENT				
4	2 of 6	S	0.23 / 1,229.72	591.31 / -44	FIRST STUDENT INC 900 SAK DRIVE CREST HILL IL 60403-2478	FINDS/FRS
Registry ID:		110006773802				
FIPS Code:		17197				
HUC Code:		07120004				
Site Type Name:		STATIONARY				
Location Description:						
Supplemental Location:						
Create Date:		01-MAR-00				
Update Date:		26-JUN-09				
Interest Types:		STATE MASTER, VSQG				
SIC Codes:		3273				
SIC Code Descriptions:		READY-MIXED CONCRETE				
NAICS Codes:						
NAICS Code Descriptions:						
Conveyor:		FRS-GEOCODE				
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:		13				
Census Block Code:		171978809032003				
EPA Region Code:		05				
County Name:		WILL				
US/Mexico Border Ind:						
Latitude:		41.56307				
Longitude:		-88.10455				
Reference Point:		CENTER OF A FACILITY OR STATION				
Coord Collection Method:		ADDRESS MATCHING-HOUSE NUMBER				
Accuracy Value:		30				
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110006773802				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						

4	3 of 6	S	0.23 / 1,229.72	591.31 / -44	First Student, Inc. #27041 900 Sak Drive Crest Hill IL 60403	TIER 2
Facility County:		Will				
Report Year(s):		2022, 2021, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010, 2009				

Tier II Details

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Report Year:	2013				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	5,000-9,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Reactivity, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2016				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	DIESEL					
Chem Health Haz:	Fire, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2016				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	5,000-9,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2015			Chemical CAS No:	68334305	
LEPC:	Will			Chemical EHS:	No	
Facility Phone:	8157260033			Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	25,000-49,999	
Facility Latitude:	41.563			Avg Daily Amt(lbs):	10,000-24,999	
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2018			Chemical CAS No:	68334305	
LEPC:	Will			Chemical EHS:	No	
Facility Phone:	8157260033			Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	25,000-49,999	
Facility Latitude:	41.563			Avg Daily Amt(lbs):	5,000-9,999	
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2020				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2019				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Report Year:	2017				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	DIESEL					
Chem Health Haz:	Fire, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2015				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	25,000-49,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2012				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL (ULTRA LOW SULFUR)				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:		2014		Chemical CAS No:	68334305	
LEPC:		Will		Chemical EHS:	No	
Facility Phone:		8157260033		Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	25,000-49,999	
Facility Latitude:		41.563		Avg Daily Amt(lbs):	10,000-24,999	
Facility Longitude:		-88.1048				
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL (ULTRA LOW SULFUR)				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:		2014		Chemical CAS No:	7664939	
LEPC:		Will		Chemical EHS:	Yes	
Facility Phone:		8157260033		Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	5,000-9,999	
Facility Latitude:		41.563		Avg Daily Amt(lbs):	5,000-9,999	
Facility Longitude:		-88.1048				
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2009				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2021				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.5634				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1051					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Mailing Zip Code:		37922				
Report Year:	2017				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	5,000-9,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Reactivity, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2013				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	DIESEL (ULTRA LOW SULFUR)					
Chem Health Haz:	Fire, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2012				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2010				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2022				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.5634				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1051					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2013				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-24,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2011				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2009				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2014				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-24,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-24,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2012				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	1,000-9,999

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Facility Latitude:	41.563				Avg Daily Amt(lbs):	1,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2010				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2011				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2009				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL FUEL NO. 2				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2011				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL (ULTRA LOW SULFUR)				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2010				Chemical CAS No:	68334305
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	1,000-9,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		DIESEL (ULTRA LOW SULFUR)				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2017				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	25,000-49,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2018				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:			41.563		Avg Daily Amt(lbs):	25,000-49,999
Facility Longitude:			-88.1048			
Corporate Name:			First Student, Inc.			
Fire Dept:			Lockport Fire Protection District			
Chemical Name:			LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)			
Chem Health Haz:			Immediate, Delayed,			
Owner:			First Student Inc			
Owner Street:			600 Vine Street, Suite 1400			
Owner City:			Cincinnati			
Owner State:			OH			
Owner Zip Code:			45202			
Owner Phone:			5132412200			
Mailing Name:			Strata Environmental			
Mailing Street:			110 Perimeter Park, Suite E			
Mailing City:			Knoxville			
Mailing State:			TN			
Mailing Zip Code:			37922			
Report Year:			2018		Chemical CAS No:	7664939
LEPC:			Will		Chemical EHS:	Yes
Facility Phone:			8157260033		Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	5,000-9,999
Facility Latitude:			41.563		Avg Daily Amt(lbs):	5,000-9,999
Facility Longitude:			-88.1048			
Corporate Name:			First Student, Inc.			
Fire Dept:			Lockport Fire Protection District			
Chemical Name:			SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)			
Chem Health Haz:			Reactivity, Immediate, Delayed,			
Owner:			First Student Inc			
Owner Street:			600 Vine Street, Suite 1400			
Owner City:			Cincinnati			
Owner State:			OH			
Owner Zip Code:			45202			
Owner Phone:			5132412200			
Mailing Name:			Strata Environmental			
Mailing Street:			110 Perimeter Park, Suite E			
Mailing City:			Knoxville			
Mailing State:			TN			
Mailing Zip Code:			37922			
Report Year:			2016		Chemical CAS No:	7439921
LEPC:			Will		Chemical EHS:	No
Facility Phone:			8157260033		Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	25,000-49,999
Facility Latitude:			41.563		Avg Daily Amt(lbs):	25,000-49,999
Facility Longitude:			-88.1048			
Corporate Name:			First Student, Inc.			
Fire Dept:			Lockport Fire Protection District			
Chemical Name:			LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)			
Chem Health Haz:			Immediate, Delayed,			

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2015			Chemical CAS No:	7664939	
LEPC:	Will			Chemical EHS:	Yes	
Facility Phone:	8157260033			Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	5,000-9,999	
Facility Latitude:	41.563			Avg Daily Amt(lbs):	5,000-9,999	
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc.				
Fire Dept:		Lockport Fire Protection District				
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		600 Vine Street, Suite 1400				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				

4	4 of 6	S	0.23 / 1,229.72	591.31 / -44	First Student Inc 900 Sak Drive Crest Hill IL 60435	IEPA DOCS
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Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: First Student Inc
Location Addr 3: 900 Sak Drive
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Indicator:	No				Latitude Measure: 41.56266	
Site ID:	170001501587				Longitude Measure: -88.10789	
System ID:	1978105083				Point X: -88.10788999999994	
Collection Dt:	12/30/2003				Point Y: 41.562660000000005	
Revision Dt Time:	02/19/2004					
Interest Type:		BOL				
Media Code:		LAND				

Details

Indicator:	No				Latitude Measure: 41.56266	
Site ID:	170001501587				Longitude Measure: -88.10789	
System ID:	1970455548				Point X: -88.10788999999994	
Collection Dt:	12/30/2003				Point Y: 41.562660000000005	
Revision Dt Time:	02/19/2004					
Interest Type:		BOL				
Media Code:		LAND				

<u>4</u>	5 of 6	S	0.23 / 1,229.72	591.31 / -44	First Student, Inc. #27041 900 Sak Drive Crest Hill IL 60435	TIER 2
Facility County:		Will				
Report Year(s):		2008				

Tier II Details

Report Year:	2008				Chemical CAS No: 68334305	
LEPC:	Will				Chemical EHS: No	
Facility Phone:	8157260033				Chemical Contents: Mixture, Liquid,	
Facility Fax:					Max Daily Amt(lbs): 10,000-99,999	
Facility Latitude:	41.563				Avg Daily Amt(lbs): 10,000-99,999	
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	DIESEL FUEL NO. 2					
Chem Health Haz:	Fire, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2008				Chemical CAS No: 7664939	

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Reactivity, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2008				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc.					
Fire Dept:	Lockport Fire Protection District					
Chemical Name:	LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	600 Vine Street, Suite 1400					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
4	6 of 6	S	0.23 / 1,229.72	591.31 / -44	First Student, Inc. #1758 900 Sak Drive Crest Hill IL 60435	TIER 2
Facility County:	Will					
Report Year(s):	2007, 2006, 2005					

Tier II Details

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Report Year:	2007				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc. #1758					
Fire Dept:						
Chemical Name:	LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)					
Chem Health Haz:	Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	705 Central Avenue, Suite 300					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2006				Chemical CAS No:	68476346
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:	First Student, Inc. #1758					
Fire Dept:						
Chemical Name:	DIESEL FUEL NO. 2					
Chem Health Haz:	Fire, Immediate, Delayed,					
Owner:	First Student Inc					
Owner Street:	705 Central Avenue, Suite 300					
Owner City:	Cincinnati					
Owner State:	OH					
Owner Zip Code:	45202					
Owner Phone:	5132412200					
Mailing Name:	Strata Environmental					
Mailing Street:	110 Perimeter Park, Suite E					
Mailing City:	Knoxville					
Mailing State:	TN					
Mailing Zip Code:	37922					
Report Year:	2007				Chemical CAS No:	7664939
LEPC:	Will				Chemical EHS:	Yes
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	1,000-9,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	1,000-9,999
Facility Longitude:	-88.1048					

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Corporate Name:		First Student, Inc. #1758				
Fire Dept:						
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		705 Central Avenue, Suite 300				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2005			Chemical CAS No:	68476-34-6	
LEPC:				Chemical EHS:	No	
Facility Phone:	8157260033			Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	10,000-99,999	
Facility Latitude:	41.563			Avg Daily Amt(lbs):	10,000-99,999	
Facility Longitude:	-88.1048					
Corporate Name:						
Fire Dept:						
Chemical Name:		Diesel Fuel No. 2				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		705 Central Avenue, Suite 300				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2006			Chemical CAS No:	7664939	
LEPC:	Will			Chemical EHS:	Yes	
Facility Phone:	8157260033			Chemical Contents:	Mixture, Liquid,	
Facility Fax:				Max Daily Amt(lbs):	1,000-9,999	
Facility Latitude:	41.563			Avg Daily Amt(lbs):	1,000-9,999	
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc. #1758				
Fire Dept:						
Chemical Name:		SULFURIC ACID (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Reactivity, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		705 Central Avenue, Suite 300				
Owner City:		Cincinnati				

<i>Map Key</i>	<i>Number of Records</i>	<i>Direction</i>	<i>Distance (mi/ft)</i>	<i>Elev/Diff (ft)</i>	<i>Site</i>	<i>DB</i>
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2006				Chemical CAS No:	7439921
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Solid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc. #1758				
Fire Dept:						
Chemical Name:		LEAD (CONTAINED IN AUTOMOTIVE BATTERIES)				
Chem Health Haz:		Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		705 Central Avenue, Suite 300				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				
Mailing Zip Code:		37922				
Report Year:	2007				Chemical CAS No:	68476346
LEPC:	Will				Chemical EHS:	No
Facility Phone:	8157260033				Chemical Contents:	Mixture, Liquid,
Facility Fax:					Max Daily Amt(lbs):	10,000-99,999
Facility Latitude:	41.563				Avg Daily Amt(lbs):	10,000-99,999
Facility Longitude:	-88.1048					
Corporate Name:		First Student, Inc. #1758				
Fire Dept:						
Chemical Name:		DIESEL FUEL NO. 2				
Chem Health Haz:		Fire, Immediate, Delayed,				
Owner:		First Student Inc				
Owner Street:		705 Central Avenue, Suite 300				
Owner City:		Cincinnati				
Owner State:		OH				
Owner Zip Code:		45202				
Owner Phone:		5132412200				
Mailing Name:		Strata Environmental				
Mailing Street:		110 Perimeter Park, Suite E				
Mailing City:		Knoxville				
Mailing State:		TN				

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Mailing Zip Code:		37922				
5	1 of 2	S	0.24 / 1,268.11	592.17 / -43	FIRST STUDENT #27041 900-910 SAK DRIVE CREST HILL IL 60403	FINDS/FRS
Registry ID:		110041918538				
FIPS Code:		IL197				
HUC Code:		07120004				
Site Type Name:		STATIONARY				
Location Description:						
Supplemental Location:						
Create Date:		30-AUG-10				
Update Date:		11-JAN-16				
Interest Types:		ICIS-NPDES NON-MAJOR, STORM WATER INDUSTRIAL				
SIC Codes:		4151				
SIC Code Descriptions:		SCHOOL BUSES				
NAICS Codes:						
NAICS Code Descriptions:						
Conveyor:		FRS-GEOCODE				
Federal Facility Code:						
Federal Agency Name:						
Tribal Land Code:						
Tribal Land Name:						
Congressional Dist No:		13				
Census Block Code:		171978809032003				
EPA Region Code:		05				
County Name:		WILL				
US/Mexico Border Ind:						
Latitude:		41.56307				
Longitude:		-88.10455				
Reference Point:		CENTER OF A FACILITY OR STATION				
Coord Collection Method:		ADDRESS MATCHING-HOUSE NUMBER				
Accuracy Value:		30				
Datum:		NAD83				
Source:						
Facility Detail Rprt URL:		https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110041918538				
Data Source:		Facility Registry Service - Single File				
Program Acronyms:						

5	2 of 2	S	0.24 / 1,268.11	592.17 / -43	FIRST STUDENT #27041 900-910 SAK DRIVE CREST HILL IL 60403	ICIS
EPA Region:		05			Federal Fac ID:	
Registry ID:		110041918538			Tribal Land Code:	
Pgm Sys ID:		ILR006865			County:	Will
Pgm Sys Acnm:		NPDES			Latitude 83:	+41.563056
Permit Type:		General Permit Covered Facility			Longitude 83:	-88.104444

Unplottable Summary

Total: 10 Unplottable sites

DB	Company Name/Site Name	Address	City	Zip	ERIS ID
AFS	H P D INC	CATON FARM RD	CREST HILL IL	60435	898831760
FINDS/FRS	NICOR GAS-STATION 21A	RTE 53 & CATON FARM RD-B	CREST HILL IL	60403	825511981
FINDS/FRS	GAS N WASH CATON FARM AND RIDGE-JOLIET	NEAR NE CORNER OF CATON FARM ROAD AND RIDGE ROAD	JOLIET IL	60432	921932198
HIST MLTS	ARRO LABORATORIES INC.	CATON FARM ROAD, P.O. BOX 686	JOLLIET IL	60434	847205401
IEPA DOCS	AAA Cooper Transport	Rte 30 & Caton Farm Rd-a	Crest Hill IL	60435	880855666
IEPA DOCS	Amoco 3732	Rte 59 & Caton Farm Rd	Joliet IL	60435	880811316
IEPA DOCS	IDOT Joliet Headquarters	Caton Farm Rd & Rte 53	Lockport IL	60441	880794386
IEPA DOCS	Joliet, City Of	Caton Farm Rd & I-55	Joliet IL	60432	880803097
IEPA DOCS	Joliet Park Dist	Caton Farm Rd & Rte 59	Joliet IL	60432	880857329
LUST DOCUMENT	Joliet Park Dist	Caton Farm Rd & Rte 59	Joliet IL	60432	878549823

Unplottable Report

Site: H P D INC
CATON FARM RD CREST HILL IL 60435

AFS

Afs ID:	1719700342	Fed Reportable:	No
Plant ID:	760036	Current Hpv:	
Epa Region:	05	Loc Contrl Region:	
Plant County:	Will	Afs Gov Fac Code:	0
State No:	17	Operating Status:	X
Primary Sic Code:	9999	Epa Class Code:	B
Secondary Sic Code:		Epa Complian Stat:	0
Naics Code:	339999	State Comp Status:	0
Afs Gov Facility Des:	PRIVATELY OWNED/OPERATED		
Operating Status Def:	Permanently Closed		
Epa Classification Des:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status:	Unknown Compliance Status		
State Compliance Status:	Unknown Compliance Status		

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	6	All Air Prog Codes:	0
Date Achieved:	19900906	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	3	All Air Prog Codes:	0
Date Achieved:	19880920	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	7C
Anu1:	2	All Air Prog Codes:	0
Date Achieved:	19880819	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	

Creation Date:
Key Action No:
Regional Data Element:
National Action Desc: STATE NOV ISSUED
All Air Program Def: 0-SIP Source
Result Def:
Pollutant Def:
All Violating Poll Def:
All Violation Type Def:

Violation Type Cds:

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	1	All Air Prog Codes:	0
Date Achieved:	19880816	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Actions

Plant ID:	760036	National Actn Type:	5C
Anu1:	5	All Air Prog Codes:	0
Date Achieved:	19890328	Result Code:	
Penalty Amount:	0	Pollutant Code:	
Record Updated Dt:	19930317	Violating Poll Cds:	
Creation Date:		Violation Type Cds:	
Key Action No:			
Regional Data Element:			
National Action Desc:	STATE INSPECTION - LEVEL 2 OR GREATER		
All Air Program Def:	0-SIP Source		
Result Def:			
Pollutant Def:			
All Violating Poll Def:			
All Violation Type Def:			

Historical Compliance - Air Program Level

Air Program Code: 0
Air Program Code Ref: SIP Source
Historical Compliance Date: 0604, 0701, 0702, 0703, 0704, 0801, 0802, 0803, 0804, 0901, 0902, 0903, 0904, 1001, 1002, 1003, 1004, 1101, 1102, 1103, 1104, 1201, 1202, 1203, 1204, 1301, 1302, 1303, 1304, 1401, 1402, 1403
Historical Compliance Status: 0
Historical Compliance Stat Ref: Unknown Compliance Status

Air Program

Plant ID:	760036	Poll Classificatn:	C
Air Program Code:	0	Poll Compli Status:	0
Air Program Status:	X	Epa Class Code:	B
Pollutant Code:	FACIL	Epa Compli Status:	0
Chemical Abstract Service Nbr:			
Air Program Code Subparts:			
Air Program Code Ref:	SIP Source		
Epa Classification Code Ref:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status Ref:	Unknown Compliance Status		
Pollutant Code Ref:			
Pollutant Classification Ref:	Class is unknown.		

Pollutant Complian Status Ref: Unknown Compliance Status

Air Program

Plant ID:	760036	Poll Classificatn:	B
Air Program Code:	0	Poll Compli Status:	0
Air Program Status:	X	Epa Class Code:	B
Pollutant Code:	PT	Epa Compli Status:	0
Chemical Abstract Service Nmbr:			
Air Program Code Subparts:			
Air Program Code Ref:	SIP Source		
Epa Classification Code Ref:	Potential uncontrolled emissions <100 tons/year		
Epa Compliance Status Ref:	Unknown Compliance Status		
Pollutant Code Ref:			
Pollutant Classification Ref:	Potential uncontrolled emissions <100 tons/year		
Pollutant Complian Status Ref:	Unknown Compliance Status		

Site: **NICOR GAS-STATION 21A**
RTE 53 & CATON FARM RD-B CREST HILL IL 60403

[FINDS/FRS](#)

Registry ID: 110062852122
FIPS Code: 17197
HUC Code:
Site Type Name: STATIONARY
Location Description:
Supplemental Location:
Create Date: 18-NOV-14
Update Date:
Interest Types: STATE MASTER
SIC Codes:
SIC Code Descriptions:
NAICS Codes:
NAICS Code Descriptions:
Conveyor:
Federal Facility Code:
Federal Agency Name:
Tribal Land Code:
Tribal Land Name:
Congressional Dist No:
Census Block Code:
EPA Region Code: 05
County Name: WILL
US/Mexico Border Ind:
Latitude:
Longitude:
Reference Point:
Coord Collection Method:
Accuracy Value:
Datum: NAD83
Source:
Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110062852122
Data Source: Facility Registry Service - Single File
Program Acronyms:

Site: **GAS N WASH CATON FARM AND RIDGE-JOLIET**
NEAR NE CORNER OF CATON FARM ROAD AND RIDGE ROAD JOLIET IL 60432

[FINDS/FRS](#)

Registry ID: 110071500810
FIPS Code:
HUC Code: 07120005
Site Type Name: STATIONARY
Location Description:
Supplemental Location:
Create Date: 12-OCT-23
Update Date:

Interest Types: ICIS-NPDES NON-MAJOR, STORM WATER CONSTRUCTION
SIC Codes:
SIC Code Descriptions:
NAICS Codes:
NAICS Code Descriptions:
Conveyor: ICIS
Federal Facility Code:
Federal Agency Name:
Tribal Land Code:
Tribal Land Name:
Congressional Dist No: 14
Census Block Code: 170938907001137
EPA Region Code: 05
County Name:
US/Mexico Border Ind:
Latitude: 41.5648
Longitude: -88.273
Reference Point:
Coord Collection Method: INTERPOLATION-MAP
Accuracy Value:
Datum: NAD83
Source:
Facility Detail Rprt URL: https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110071500810
Data Source: Facility Registry Service - Single File
Program Acronyms:

Site: ARRO LABORATORIES INC.
CATON FARM ROAD, P.O. BOX 686 JOLIET IL 60434

[HIST MLTS](#)

Docket: 3004222
License No: 12-11646-01

Site: AAA Cooper Transport
Rte 30 & Caton Farm Rd-a Crest Hill IL 60435

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: AAA Cooper Transport
Location Addr 3: Rte 30 & Caton Farm Rd-a
City Name: Crest Hill
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.565762
Site ID:	170000803708	Longitude Measure:	-88.142366
System ID:	1970253002	Point X:	-88.14236599999998
Collection Dt:	01/19/2010	Point Y:	41.565762000000006
Revision Dt Time:	01/19/2010		
Interest Type:	BOL		
Media Code:	LAND		

Site: Amoco 3732
Rte 59 & Caton Farm Rd Joliet IL 60435

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Amoco 3732
Location Addr 3: Rte 59 & Caton Farm Rd
City Name: Joliet
State Code: IL
Postal Code: 60435

Details

Indicator:	No	Latitude Measure:	41.565088
Site ID:	170000360179	Longitude Measure:	-88.200333
System ID:	1970455298	Point X:	-88.20033299999994
Collection Dt:	01/27/2010	Point Y:	41.565088000000006
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

Site: IDOT Joliet Headquarters
Caton Farm Rd & Rte 53 Lockport IL 60441

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: IDOT Joliet Headquarters
Location Addr 3: Caton Farm Rd & Rte 53
City Name: Lockport
State Code: IL
Postal Code: 60441

Details

Indicator:	Yes	Latitude Measure:	41.56722
Site ID:	170000376368	Longitude Measure:	-88.08772
System ID:	1970505070	Point X:	-88.08771999999999
Collection Dt:	11/07/2002	Point Y:	41.567220000000008
Revision Dt Time:	02/24/2009		
Interest Type:	BOL		
Media Code:	LAND		

Site: Joliet, City Of
Caton Farm Rd & I-55 Joliet IL 60432

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Joliet, City Of
Location Addr 3: Caton Farm Rd & I-55
City Name: Joliet
State Code: IL
Postal Code: 60432

Details

Indicator:	No	Latitude Measure:	41.56532
Site ID:	170000806901	Longitude Measure:	-88.18097
System ID:	1970455446	Point X:	-88.18096999999995
Collection Dt:	04/12/2010	Point Y:	41.565320000000004
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		

Media Code: LAND

Site: Joliet Park Dist
Caton Farm Rd & Rte 59 Joliet IL 60432

[IEPA DOCS](#)

Note: Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: <https://external.epa.illinois.gov/DocumentExplorer>

IEPA Source Water Assessment Program (SWAP) & Mapping Tool

Name: Joliet Park Dist
Location Addr 3: Caton Farm Rd & Rte 59
City Name: Joliet
State Code: IL
Postal Code: 60432

Details

Indicator:	No	Latitude Measure:	41.56543
Site ID:	170000806894	Longitude Measure:	-88.19975
System ID:	1970455445	Point X:	-88.19974999999994
Collection Dt:	11/07/2002	Point Y:	41.56543000000005
Revision Dt Time:	06/30/2003		
Interest Type:	BOL		
Media Code:	LAND		

Site: Joliet Park Dist
Caton Farm Rd & Rte 59 Joliet IL 60432

[LUST DOCUMENT](#)

Site ID (Map):	170000806894	Originating Bureau (Web):	
System ID (Map):	1970455445	City (Web):	
Program ID (Web):		State (Web):	
Interest Type (Map):	LUST	Zip (Web):	
Media Code (Map):	LAND	City (Map):	Joliet
Category (Web):		State (Map):	IL
Document Indicator (Map):	No	Zip (Map):	60432
Document Count (Web):		Latitude (Map):	41.56543
Total Pages (Web):		Longitude (Map):	-88.19975
Revision Date Time (Map):	06/30/2003	X (Map):	-88.19974999999994
Collection Date (Map):	01/01/2001	Y (Map):	41.56543000000005
Name (Web):			
Address (Web):			
Name (Map):	Joliet Park Dist		
Address (Map):	Caton Farm Rd & Rte 59		
Category URL (Web):			
Data Source:	IEPA Source Water Assessment Program (SWAP) & Mapping Tool (Map)		
Note:	Documents related to facilities in Illinois can be searched on the Illinois Environmental Protection Agency (IEPA) Document Explorer: https://external.epa.illinois.gov/DocumentExplorer		

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ERIS updates databases as set out in ASTM Standard E1527-13 and E1527-21, Section 8.1.8 Sources of Standard Source Information:

"Government information from nongovernmental sources may be considered current if the source updates the information at least every 90 days, or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public."

Standard Environmental Record Sources

Federal

National Priority List:

NPL

The U.S. Environmental Protection Agency (EPA)'s National Priorities List (NPL) includes the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program, based primarily on the score a site receives from EPA's Hazard Ranking System. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. This data includes NPL sites represented as polygons, where available, that can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. As site investigation and remediation progress, OUs may be added, modified or refined. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

National Priority List - Proposed:

PROPOSED NPL

Sites proposed by the U.S. Environmental Protection Agency (EPA), the state agency, or concerned citizens for addition to the National Priorities List (NPL) due to contamination by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health and/or the environment. Sites represented as polygons, where available, can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

Deleted NPL:

DELETED NPL

Sites deleted from the U.S. Environmental Protection Agency (EPA)'s National Priorities List (NPL). The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate. Sites represented as polygons, where available, can be sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). These site boundaries represent the footprint of a whole site, the sum of all the Operable Units (OUs) and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Sep 25, 2024

SEMS List 8R Active Site Inventory:[SEMS](#)

The U.S. Environmental Protection Agency's (EPA) Superfund Program has deployed the Superfund Enterprise Management System (SEMS), which integrates multiple legacy systems into a comprehensive tracking and reporting tool. This inventory contains active sites evaluated by the Superfund program that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. This data includes SEMS sites from the List 8R Active file as well as applicable sites from the EPA's Facility Registry Service map tool.

Government Publication Date: Oct 24, 2024

Inventory of Open Dumps, June 1985:[ODI](#)

The Resource Conservation and Recovery Act (RCRA) provides for publication of an inventory of open dumps. The Act defines "open dumps" as facilities which do not comply with EPA's "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR 257).

Government Publication Date: Jun 1985

SEMS List 8R Archive Sites:[SEMS ARCHIVE](#)

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. This data includes sites from the List 8R Archived site file.

Government Publication Date: Oct 24, 2024

Comprehensive Environmental Response, Compensation and Liability Information System -[CERCLIS](#)**CERCLIS:**

Superfund is a program administered by the United States Environmental Protection Agency (EPA) to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The EPA administers the Superfund program in cooperation with individual states and tribal governments; this database is made available by the EPA.

Government Publication Date: Oct 25, 2013

EPA Report on the Status of Open Dumps on Indian Lands:[IODI](#)

Public Law 103-399, The Indian Lands Open Dump Cleanup Act of 1994, enacted October 22, 1994, identified congressional concerns that solid waste open dump sites located on American Indian or Alaska Native (AI/AN) lands threaten the health and safety of residents of those lands and contiguous areas. The purpose of the Act is to identify the location of open dumps on Indian lands, assess the relative health and environment hazards posed by those sites, and provide financial and technical assistance to Indian tribal governments to close such dumps in compliance with Federal standards and regulations or standards promulgated by Indian Tribal governments or Alaska Native entities.

Government Publication Date: Dec 31, 1998

CERCLIS - No Further Remedial Action Planned:[CERCLIS NFRAP](#)

An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. The Archive designation means that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Government Publication Date: Oct 25, 2013

CERCLIS Liens:[CERCLIS LIENS](#)

A Federal Superfund lien exists at any property where EPA has incurred Superfund costs to address contamination ("Superfund site") and has provided notice of liability to the property owner. A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. This database is made available by the United States Environmental Protection Agency (EPA). This database was provided by the United States Environmental Protection Agency (EPA). Refer to SEMS LIEN as the current data source for Superfund Liens.

Government Publication Date: Jan 30, 2014

RCRA CORRACTS-Corrective Action:[RCRA CORRACTS](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. At these sites, the Corrective Action Program ensures that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination, geology, and anticipated use unique to each site.

Government Publication Date: Oct 21, 2024

RCRA non-CORRACTS TSD Facilities:[RCRA TSD](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This database includes Non-Corrective Action sites that have indicated engagement in the treatment, storage, or disposal of hazardous waste which requires a RCRA hazardous waste permit.

Government Publication Date: Oct 21, 2024

RCRA Generator List:[RCRA LQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste.

Government Publication Date: Oct 21, 2024

RCRA Small Quantity Generators List:[RCRA SQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.

Government Publication Date: Oct 21, 2024

RCRA Very Small Quantity Generators List:[RCRA VSQG](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Very Small Quantity Generators (VSQG) generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.

Government Publication Date: Oct 21, 2024

RCRA Non-Generators:[RCRA NON GEN](#)

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Non-Generators do not presently generate hazardous waste.

Government Publication Date: Oct 21, 2024

RCRA Sites with Controls:[RCRA CONTROLS](#)

List of Resource Conservation and Recovery Act (RCRA) facilities with institutional controls in place. RCRA gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Government Publication Date: Oct 21, 2024

Federal Engineering Controls-ECs:[FED ENG](#)

List of Engineering controls (ECs) made available by the United States Environmental Protection Agency (EPA). ECs encompass a variety of engineered and constructed physical barriers (e.g., soil capping, sub-surface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. The EC listing includes remedy component data from Superfund decision documents for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Nov 20, 2024

Federal Institutional Controls- ICs:

FED INST

List of Institutional controls (ICs) made available by the United States Environmental Protection Agency (EPA). ICs are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site. The IC listing includes remedy component data from Superfund decision documents for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Nov 20, 2024

Land Use Control Information System:

LUCIS

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

Government Publication Date: Sep 1, 2006

Institutional Control Boundaries at NPL sites:

NPL IC

These boundaries of Institutional Control areas at sites on the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL), or as Proposed or Deleted, are sourced from the EPA NPL Superfund Site Boundaries dataset, refreshed by the Shared Enterprise Geodata and Services (SEGS). The EPA's NPL includes the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Data provided by external parties is not independently verified by EPA. This boundary data is made available to the public strictly for informational purposes.

Government Publication Date: Sep 25, 2024

Emergency Response Notification System:

ERNS 1982 TO 1986

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1982-1986

Emergency Response Notification System:

ERNS 1987 TO 1989

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1987-1989

Emergency Response Notification System:

ERNS

Database of oil and hazardous substances spill reports made available by the United States Coast Guard National Response Center (NRC). The NRC fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. These data contain initial incident data that has not been validated or investigated by a federal/state response agency.

Government Publication Date: Oct 15, 2024

The Assessment, Cleanup and Redevelopment Exchange System (ACRES) Brownfield Database:

FED BROWNFIELDS

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. This data is provided by the United States Environmental Protection Agency (EPA) and includes Brownfield sites from the Cleanups in My Community (CIMC) web application.

Government Publication Date: Feb 7, 2024

FEMA Underground Storage Tank Listing:

FEMA UST

The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security maintains a list of FEMA owned underground storage tanks.

Government Publication Date: Dec 31, 2017

Facility Response Plan:

FRP

This listing contains facilities that have submitted Facility Response Plans (FRPs) to the U.S. Environmental Protection Agency (EPA). Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit FRPs. Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments. This listing includes FRP facilities from an applicable EPA FOIA file and Homeland Infrastructure Foundation-Level Data (HIFLD) data file.

Government Publication Date: Jan 9, 2024

Delisted Facility Response Plans:

DELISTED FRP

Facilities that once appeared in - and have since been removed from - the list of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Jan 9, 2024

Historical Gas Stations:

HIST GAS STATIONS

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

Government Publication Date: Jul 1, 1930

Petroleum Refineries:

REFN

This list of petroleum refineries is sourced from the U.S. Energy Information Administration (EIA), Refinery Capacity Report. The listing includes operating and idle petroleum refineries (including new refineries under construction) and refineries shut down during the previous year. The geographic area the report covers is the 50 States, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, and other U.S. possessions. Per the EIA, the facility location data represents the approximate location based on research of publicly available information from sources such as Federal agencies, company websites, and satellite images on public websites.

Government Publication Date: Jun 6, 2024

Petroleum Product and Crude Oil Rail Terminals:

BULK TERMINAL

A list of petroleum product and crude oil rail terminals from the U.S. Energy Information Administration (EIA), as well as petroleum terminals sourced from the Federal Communications Commission Data hosted by the Homeland Infrastructure Foundation-Level Database. Data includes operable bulk petroleum product terminals with a total bulk shell storage capacity of 50,000 barrels or more, and/or the ability to receive volumes from tanker, barge, or pipeline; also rail terminals handling the loading and unloading of crude oil with activity between 2017 and 2018. EIA petroleum product terminal data comes from the EIA-815 Bulk Terminal and Blender Report, which includes working, shell in operation, and shell idle for several major product groupings.

Government Publication Date: Jun 6, 2024

LIEN on Property:

SEMS LIEN

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) provides Lien details on applicable properties, such as the Superfund lien on property activity, the lien property information, and the parties associated with the lien.

Government Publication Date: Oct 24, 2024

Superfund Decision Documents:

SUPERFUND ROD

This database contains a list of decision documents for Superfund sites. Decision documents serve to provide the reasoning for the choice of (or) changes to a Superfund Site cleanup plan. The decision documents include completed Records of Decision (ROD), ROD Amendments, Explanations of Significant Differences (ESD) for active and archived sites stored in the Superfund Enterprise Management System (SEMS), along with other associated memos and files. This information is maintained and made available by the U.S. Environmental Protection Agency.

Government Publication Date: Oct 24, 2024

Formerly Utilized Sites Remedial Action Program:

DOE FUSRAP

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

Government Publication Date: Mar 4, 2017

State

State Response Action Program Database:

[SSU](#)

The State Response Action Program database identifies the status of all sites under the responsibility of the Illinois EPA's State Sites Unit. The State Response Action Program database made available by Illinois Environmental Protection Agency. This database serves a purpose similar to that of the federal Superfund Enterprise Management System (SEMS), functioning as a state-level counterpart for tracking potential hazardous substance release sites.

Government Publication Date: Aug 3, 2023

Delisted State Response Action Program:

[DELISTED SSU](#)

List of sites removed from the State Response Action Program database identifies the status of all sites under the responsibility of the Illinois EPA's State Sites Unit.

Government Publication Date: Aug 3, 2023

Solid Waste Landfills Subject to State Surcharge Database:

[SWF/LF](#)

The Bureau of Land maintains a list of solid waste facilities and landfills throughout the state. This list made available by Illinois Environmental Protection Agency's Bureau of land.

Government Publication Date: Jun 24, 2024

Special Waste Site List:

[SWF/LF SPECIAL](#)

The following landfills are those that as of January 1, 1990, accept non-hazardous special waste pursuant to the Illinois Environmental Protection Agency Non-Hazardous Special Waste Definition. List A includes landfills that may receive any non-hazardous waste. Non-Regional Pollutant Control Facilities are so noted. List B includes landfills designed to receive specific non-hazardous wastes. List B landfills are designated as a Regional Pollutant Control Facility by RPCF, or Non-regional Pollutant Control Facility by Non-RPCF.

Government Publication Date: Jan 1, 1990

Northeastern Illinois Planning Commission Historical Inventory of Solid Waste Disposal Sites in

[NIPC](#)

Northeastern Illinois:

Historical inventory of solid waste disposal sites in northeastern Illinois prepared by the Northeastern Illinois Planning Commission (NIPC).

Government Publication Date: Dec 1987

Clean Construction or Demolition Debris:

[CCDD](#)

This is a list of CCDD Fill Operations with Approved Permits. Beginning July 1, 2008, no person can use CCDD as fill material in a current or former quarry, mine, or other excavation unless they have obtained a permit from the Illinois EPA.

Government Publication Date: Oct 3, 2023

Leaking Underground Storage Tanks (LUST):

[LUST](#)

Leaking underground storage tanks (LUSTs) are a significant source of environmental contamination and may pose threats to human health and safety. The Illinois Office of the State Fire Marshal (OSFM) regulates the daily operation and maintenance of UST systems. When a release occurs, a tank owner, operator, or their designated representative, must notify the Illinois Emergency Management Agency (IEMA), which then notifies the Illinois Environmental Protection Agency (Illinois EPA). The Illinois EPA's LUST Section begins oversight of remedial activities only after the UST release has been reported to the IEMA.

Government Publication Date: Nov 15, 2024

Leaking UST Document:

[LUST DOCUMENT](#)

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more of the documents is in the Leaking Underground Storage Tank (LUST) category. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Delisted Leaking Underground Storage Tank Sites:

[DELISTED LUST](#)

List of sites removed from the Leaking Underground Storage Tank Incident Tracking (LIT) database made available by the Illinois Environmental Protection Agency.

Government Publication Date: Oct 21, 2024

Underground Storage Tank Fund Payment Priority List:

[LUST TRUST](#)

In case sufficient funds are not available in the Underground Storage Tank Fund, requests for payment are entered on the Payment Priority List by "queue date" order. As required by the Environmental Protection Act, the queue date is the date that a complete request for partial or final payment was received by the Agency. The queue date is "officially" confirmed at the end of the payment review process when a Final Decision Letter is sent to the site owner. The Underground Storage Tank Fund Priority list made available by Illinois Environmental Protection Agency.

Government Publication Date: Nov 01, 2016

Underground Storage Tank Database (UST):

UST

This Underground Storage Tank (UST) database is maintained by the Division of Petroleum & Chemical Safety of the Office of the Illinois State Fire Marshal (OSFM). Agency Disclaimer: The data contains information derived from tank registration information supplied to the OSFM from outside sources. This information may not contain complete or current information on a specific tank.

Government Publication Date: Oct 21, 2024

Aboveground Storage Tanks (AST):

AST

A list of aboveground storage tanks inspected by the Office of State Fire Marshal (OSFM).

Government Publication Date: Nov 1, 2024

Delisted Storage Tanks:

DELISTED TANK

This database contains a list of closed storage tank sites that were removed from the Illinois Department of Environmental Quality.

Government Publication Date: Oct 21, 2024

Sites with Engineering Controls:

ENG

Sites in the Illinois Environmental Protection Agency (IEPA)'s Site Remediation Program (SRP) database with engineering controls in place.

Government Publication Date: Nov 22, 2024

Institutional Controls:

INST

Sites in the Illinois Environmental Protection Agency (IEPA)'s Site Remediation Program (SRP) database with institutional controls in place.

Government Publication Date: Nov 22, 2024

Environmental Covenants Registry:

AUL

According to the Illinois Environmental Protection Agency (Illinois EPA), the Illinois Uniform Environmental Covenants Act (UECA) (765 Illinois Compiled Statutes (ILCS) 122 et seq.) creates an environmental covenant that is a specific recordable interest in real estate. It arises from an environmental response project that imposes activity and use limitations on a property. No environmental covenant is effective without the approval of the Illinois EPA, through the Director's signature. The UECA instrument recites the property use controls and remediation requirements imposed upon the property. Section 12(a) of the Illinois UECA requires the Illinois EPA to establish and maintain a registry that contains all environmental covenants and any amendment or termination of those covenants.

Government Publication Date: Aug 8, 2024

Illinois Site Remediation Program Database:

SRP

The Site Remediation Program (SRP) database identifies the status of all voluntary remediation projects administered through the Pre-Notice Site Cleanup Program (1989 to 1995) and the Site Remediation Program (1996 to the present). The SRP database is made available by the Illinois Environmental Protection Agency (IEPA).

Government Publication Date: Nov 22, 2024

Document Explorer Remediation and Assessment Sites:

REM ASSESS

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more documents available are associated with the Federal Facilities Unit, National Priorities List Unit, Site Assessment Unit, or Voluntary Site Remediation Unit. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Brownfields Redevelopment Assessment Database:

BROWNFIELDS

This listing of Brownfields Redevelopment Assessment sites is provided by the Illinois Environmental Protection Agency's (IL EPA) Bureau of Land. Brownfields are abandoned or under-utilized industrial and commercial properties with actual or perceived contamination and an active potential for redevelopment. The IL EPA Remedial Project Management Section (RPMS) manages the Brownfields loan programs and offers technical support to communities through the services of its Brownfields Representatives.

Government Publication Date: Jun 4, 2024

Municipal Brownfields Redevelopment Grant Program (MBRGP) project sites administered through OBA:

[BROWN MBRGP](#)

The Office of Brownfields Assistance (OBA) database identifies the status of all Municipal Brownfields Redevelopment Grant Program (MBRGP) project sites administered through OBA. Office of Brownfields Assistance Database search made available by Illinois Environmental Protection Agency's Bureau of Land Data-Center.

Government Publication Date: Mar 31, 2013

Tribal

Leaking Underground Storage Tanks on Indian Lands:

[INDIAN LUST](#)

This list of leaking underground storage tanks (LUSTs) on Tribal/Indian Lands in Region 5, which includes Illinois, is made available by the United States Environmental Protection Agency (EPA). There are no federally recognized Tribes in Illinois, according to the U.S. Department of Interior, Bureau of Indian Affairs.

Government Publication Date: Oct 16, 2017

Underground Storage Tanks (USTs) on Indian Lands:

[INDIAN UST](#)

This list of underground storage tanks (USTs) on Tribal/Indian Lands in Region 5, which includes Illinois, is made available by the United States Environmental Protection Agency (EPA). There are no federally recognized Tribes in Illinois, according to the U.S. Department of Interior, Bureau of Indian Affairs.

Government Publication Date: Oct 16, 2017

Delisted Tribal Leaking Storage Tanks:

[DELISTED INDIAN LST](#)

Leaking Underground Storage Tank (LUST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian LUST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: May 7, 2024

Delisted Tribal Underground Storage Tanks:

[DELISTED INDIAN UST](#)

Underground Storage Tank (UST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian UST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: May 7, 2024

County

No County databases were selected to be included in the search.

Additional Environmental Record Sources

Federal

PFAS Greenhouse Gas Emissions Data:

[PFAS GHG](#)

The U.S. Environmental Protection Agency's Greenhouse Gas Reporting Program (GHGRP) collects Greenhouse Gas (GHG) data from large emitting facilities (25,000 metric tons of carbon dioxide equivalent (CO₂e) per year), and suppliers of fossil fuels and industrial gases that results in GHG emissions when used. Includes GHG emissions data for facilities that emit or have emitted since 2010 chemicals identified in EPA's CompTox Chemicals Dashboard list of PFAS without explicit structures and list of PFAS structures by DSSTox. PFAS emissions data has been identified for facilities engaged in the following industrial processes: Aluminum Production (GHGRP Subpart F), HCFC-22 Production and HFC-23 Destruction (Subpart O), Electronics Manufacturing (Subpart I), Fluorinated Gas Production (Subpart L), Magnesium Production (Subpart T), Electrical Transmission and Distribution Equipment Use (Subpart DD), and Manufacture of Electric Transmission and Distribution Equipment (Subpart SS). Over time, other industrial processes with required GHGRP reporting may include PFAS emissions data and the list of reportable gases may change over time.

Government Publication Date: Aug 5, 2024

On-Scene Coordinator Response Sites:

[OSC RESPONSE](#)

This list of On-Scene Coordinator (OSC) Response Sites is provided by the U.S. Environmental Protection Agency (EPA). OSCs are the federal officials responsible for monitoring or directing responses to all oil spills and hazardous substance releases reported to the federal government. OSCs coordinate all federal efforts with, and provide support and information to local, state, and regional response communities. An OSC is an agent of either EPA or the U.S. Coast Guard (USCG), depending on where the incident occurs. EPA's OSCs have primary responsibility for spills and releases to inland areas and waters. USCG OSCs have responsibility for coastal waters and the Great Lakes. In general, an OSC has the following key responsibilities during and after a response: Assessment, Monitoring, Response Assistance, and Evaluation.

Government Publication Date: Apr 4, 2024

Facility Registry Service/Facility Index:

[FINDS/FRS](#)

The Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, and data collected from EPA's Central Data Exchange registrations and data management personnel. This list is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Aug 1, 2024

Toxics Release Inventory (TRI) Program:

[TRIS](#)

The U.S. Environmental Protection Agency's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of toxic chemicals from U.S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment. There are currently 770 individually listed chemicals and 33 chemical categories covered by the TRI Program. Facilities that manufacture, process or otherwise use these chemicals in amounts above established levels must submit annual reporting forms for each chemical. Note that the TRI chemical list does not include all toxic chemicals used in the U.S. One of TRI's primary purposes is to inform communities about toxic chemical releases to the environment. This database includes TRI Reporting Data for calendar years 1987 through 2021 and Preliminary Data for 2022.

Government Publication Date: Sep 20, 2023

Hazardous Materials Information Reporting System:

[HMIRS](#)

The Hazardous Materials Incident Reporting System (HMIRS) database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Government Publication Date: May 29, 2024

National Clandestine Drug Labs:

[NCDL](#)

The U.S. Department of Justice ("the Department"), Drug Enforcement Administration (DEA), provides this data as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy.

Government Publication Date: Nov 30, 2023

Toxic Substances Control Act:

[TSCA](#)

The U.S. Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule. The CDR enables EPA to collect and publish information on the manufacturing, processing, and use of commercial chemical substances and mixtures (referred to hereafter as chemical substances) on the TSCA Chemical Substance Inventory (TSCA Inventory). This includes current information on chemical substance production volumes, manufacturing sites, and how the chemical substances are used. This information helps the Agency determine whether people or the environment are potentially exposed to reported chemical substances. EPA publishes submitted CDR data that is not Confidential Business Information (CBI). EPA CDR collections occur approximately every four years and reporting requirements change per collection.

Government Publication Date: May 12, 2022

Hist TSCA:

[HIST TSCA](#)

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The 2006 IUR data summary report includes information about chemicals manufactured or imported in quantities of 25,000 pounds or more at a single site during calendar year 2005. In addition to the basic manufacturing information collected in previous reporting cycles, the 2006 cycle is the first time EPA collected information to characterize exposure during manufacturing, processing and use of organic chemicals. The 2006 cycle also is the first time manufacturers of inorganic chemicals were required to report basic manufacturing information.

Government Publication Date: Dec 31, 2006

FTTS Administrative Case Listing:

[FTTS ADMIN](#)

An administrative case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

FTTS Inspection Case Listing:

[FTTS INSP](#)

An inspection case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

Potentially Responsible Parties List:

[PRP](#)

Early in the site cleanup process, the U.S. Environmental Protection Agency (EPA) conducts a search to find the Potentially Responsible Parties (PRPs). The EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site. This listing contains PRPs, Noticed Parties, at sites in the EPA's Superfund Enterprise Management System (SEMS).

Government Publication Date: Jul 24, 2024

State Coalition for Remediation of Drycleaners Listing:

[SCRD DRYCLEANER](#)

The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998, with support from the U.S. Environmental Protection Agency (EPA) Office of Superfund Remediation and Technology Innovation. Coalition members are states with mandated programs and funding for drycleaner site remediation. Current members are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin. Since 2017, the SCRD no longer maintains this data, refer to applicable state source data where available.

Government Publication Date: Nov 08, 2017

Integrated Compliance Information System (ICIS):

[ICIS](#)

The Integrated Compliance Information System (ICIS) database contains integrated enforcement and compliance information across most of U.S. Environmental Protection Agency's (EPA) programs. The vision for ICIS is to replace EPA's independent databases that contain enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions and a subset of the Permit Compliance System (PCS), which supports the National Pollutant Discharge Elimination System (NPDES). This information is maintained by the EPA Headquarters and at the Regional offices. A future release of ICIS will completely replace PCS and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities that support compliance and enforcement programs, including incident tracking, compliance assistance, and compliance monitoring.

Government Publication Date: Apr 13, 2024

Drycleaner Facilities:

[FED DRYCLEANERS](#)

A list of drycleaner facilities from Enforcement and Compliance History Online (ECHO) data as made available by the U.S. Environmental Protection Agency (EPA), sourced from the ECHO Exporter file. The EPA tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

Government Publication Date: May 5, 2024

Delisted Drycleaner Facilities:

[DELISTED FED DRY](#)

List of sites removed from the list of Drycleaner Facilities (sites in the EPA's Integrated Compliance Information System (ICIS) with NAIC or SIC codes identifying the business as a drycleaner establishment).

Government Publication Date: May 5, 2024

Formerly Used Defense Sites:

[FUDS](#)

Formerly Used Defense Sites (FUDS) are properties that were formerly owned by, leased to, or otherwise possessed by and under the jurisdiction of the Secretary of Defense prior to October 1986, where the Department of Defense (DOD) is responsible for an environmental restoration. The FUDS Annual Report to Congress (ARC) is published by the U.S. Army Corps of Engineers (USACE). This data is compiled from the USACE's Geospatial FUDS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) FUDS dataset which applies to the Fiscal Year 2021 FUDS Inventory.

Government Publication Date: May 15, 2023

FUDS Munitions Response Sites:

[FUDS MRS](#)

Boundaries of Munitions Response Sites (MRS), published with the Formerly Used Defense Sites (FUDS) Annual Report to Congress (ARC) by the U.S. Army Corps of Engineers (USACE). An MRS is a discrete location within a Munitions response area (MRA) that is known to require a munitions response. An MRA means any area on a defense site that is known or suspected to contain unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC). This data is compiled from the USACE's Geospatial MRS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) MRS dataset.

Government Publication Date: May 15, 2023

Former Military Nike Missile Sites:

FORMER NIKE

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

Government Publication Date: Dec 2, 1984**PHMSA Pipeline Safety Flagged Incidents:**

PIPELINE INCIDENT

This list of flagged pipeline incidents is made available by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA regulations require incident and accident reports for five different pipeline system types. Accidents reported on hazardous liquid gravity lines (§195.13) and reporting-regulated-only hazardous liquid gathering lines (§195.15) and incidents reported on Type R gas gathering (§192.8(c)) are not included in the flagged incident file data.

Government Publication Date: May 6, 2024**Material Licensing Tracking System (MLTS):**

MLTS

A list of sites that store radioactive material subject to the Nuclear Regulatory Commission (NRC) licensing requirements. This list is maintained by the NRC. As of September 2016, the NRC no longer releases location information for sites. Site locations were last received in July 2016.

Government Publication Date: May 11, 2021**Historic Material Licensing Tracking System (MLTS) sites:**

HIST MLTS

A historic list of sites that have inactive licenses and/or removed from the Material Licensing Tracking System (MLTS). In some cases, a site is removed from the MLTS when the state becomes an "Agreement State". An Agreement State is a State that has signed an agreement with the Nuclear Regulatory Commission (NRC) authorizing the State to regulate certain uses of radioactive materials within the State.

Government Publication Date: Jan 31, 2010**Mines Master Index File:**

MINES

The Master Index File (MIF) is provided by the United States Department of Labor, Mine Safety and Health Administration (MSHA). This file, which was originally created in the 1970's, contained many Mine-IDs that were invalid. MSHA removes invalid IDs from the MIF upon discovery. MSHA applicable data includes the following: all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970; mine addresses for all mines in the database except for Abandoned mines prior to 1998 from MSHA's legacy system (addresses may or may not correspond with the physical location of the mine itself); violations that have been assessed penalties as a result of MSHA inspections beginning on 1/1/2000; and violations issued as a result of MSHA inspections conducted beginning on 1/1/2000.

Government Publication Date: Feb 5, 2024**Surface Mining Control and Reclamation Act Sites:**

SMCRA

This inventory of land and water impacted by past mining (primarily legacy coal mining operations) is maintained by the U.S. Department of the Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE), as it provides information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). This inventory contains information on the type and extent of Abandoned Mine Land (AML) Problems, as well as information on the cost associated with the reclamation of those problems. The data is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed. Disclaimer: Per the OSMRE, States and tribes who enter their data into e-AMLIS (AML Inventory System) may truncate their latitude and longitude so the precise location of usually dangerous AMLs is not revealed in an effort to protect the public from searching for these AMLs, most of which are on private property. If more precise location information is needed, please contact the applicable state/tribe of interest.

Government Publication Date: May 20, 2024**Mineral Resource Data System:**

MRDS

The Mineral Resource Data System (MRDS) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. The USGS has ceased systematic updates of the MRDS database with their focus more recently on deposits of critical minerals while providing a well-documented baseline of historical mine locations from USGS topographic maps.

Government Publication Date: Mar 15, 2016

DOE Legacy Management Sites:

LM SITES

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) currently manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The LM manages sites with diverse regulatory drivers (statutes or programs that direct cleanup and management requirements at DOE sites) or as part of internal DOE or congressionally-recognized programs, such as but not limited to: Formerly Utilized Sites Remedial Action Program (FUSRAP), Uranium Mill Tailings Radiation Control Act (UMTRCA Title I, Title II), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Decontamination and Decommissioning (D&D), Nuclear Waste Policy Act (NWPA). This site listing includes data exported from the DOE Office of LM's Geospatial Environmental Mapping System (GEMS). GEMS Data disclaimer: The DOE Office of LM makes no representation or warranty, expressed or implied, regarding the use, accuracy, availability, or completeness of the data presented herein.

Government Publication Date: Dec 12, 2023

Alternative Fueling Stations:

ALT FUELS

This list of alternative fueling stations is sourced from the Alternative Fuels Data Center (AFDC). The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy launched the AFDC in 1991 as a repository for alternative fuel vehicle performance data, which provides a wealth of information and data on alternative and renewable fuels, advanced vehicles, fuel-saving strategies, and emerging transportation technologies. The data includes Biodiesel (B20 and above), Compressed Natural Gas (CNG), Electric, Ethanol (E85), Hydrogen, Liquefied Natural Gas (LNG), Propane (LPG), and Renewable Diesel (R20 and above) fuel type locations.

Government Publication Date: Aug 29, 2024

Superfunds Consent Decrees:

CONSENT DECREES

This list of Superfund consent decrees is provided by the Department of Justice, Environment & Natural Resources Division (ENRD) through a Freedom of Information Act (FOIA) applicable file. This listing includes Cases filed since 2010 limited to the following: Consent Decrees for CERCLA or Superfund Sites filed and/or as proposed within the ENRD's Case Management System (CMS); and applicable ENRD's Environmental Defense Section (EDS) CERCLA Cases with "Consent" in History Note. CMS may not reflect the latest developments in a case, nor can the agency guarantee the accuracy of the data. ENRD Disclaimer: Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA; response is limited to those records that are subject to the requirements of the FOIA; however, this should not be taken as an indication that excluded records do, or do not, exist.

Government Publication Date: Jun 26, 2024

Air Facility System:

AFS

This EPA retired Air Facility System (AFS) dataset contains emissions, compliance, and enforcement data on stationary sources of air pollution. Regulated sources cover a wide spectrum; from large industrial facilities to relatively small operations such as dry cleaners. AFS does not contain data on facilities that are solely asbestos demolition and/or renovation contractors, or landfills. ECHO Clean Air Act data from AFS are frozen and reflect data as of October 17, 2014; the EPA retired this system for Clean Air Act stationary sources and transitioned to ICIS-Air.

Government Publication Date: Oct 17, 2014

Registered Pesticide Establishments:

SSTS

This national list of active EPA-registered foreign and domestic pesticide and/or device-producing establishments is based on data from the Section Seven Tracking System (SSTS). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 7 requires that each producing establishment must place its EPA establishment number on the label or immediate container of each pesticide, active ingredient or device produced. An EPA establishment number on a pesticide product label identifies the EPA registered location where the product was produced. The list of establishments is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Feb 29, 2024

Polychlorinated Biphenyl (PCB) Transformers:

PCBT

Locations of Transformers Containing Polychlorinated Biphenyls (PCBs) registered with the United States Environmental Protection Agency. PCB transformer owners must register their transformer(s) with EPA. Although not required, PCB transformer owners who have removed and properly disposed of a registered PCB transformer may notify EPA to have their PCB transformer de-registered. Data made available by EPA.

Government Publication Date: Oct 15, 2019

Polychlorinated Biphenyl (PCB) Notifiers:

PCB

Facilities included in the national list of facilities that have notified the United States Environmental Protection Agency (EPA) of Polychlorinated Biphenyl (PCB) activities. Any company or person storing, transporting or disposing of PCBs or conducting PCB research and development must notify the EPA and receive an identification number.

Government Publication Date: May 23, 2024

Power Plants:

POWER PLANTS

This list of power plants is provided by the U.S. Energy Information Administration (EIA). The listing includes operable electric generating plants in the United States by energy source, originating from the EIA-860, Annual Electric Generator Report; EIA-860M, Monthly Update to the Annual Electric Generator Report; and EIA-923, Power Plant Operations Report. It includes all operable plants by energy source with a combined nameplate capacity of 1 megawatt or more that are operating, are on standby, or out of service for short- or long-term.

Government Publication Date: Apr 15, 2024

State

Spills and Incidents:

[SPILLS](#)

This listing of hazardous materials spill/incident reports is sourced from the Illinois Emergency Management Agency (IEMA)

Government Publication Date: Sep 11, 2024

Emergency Response Releases & Spills Database:

[SPILL OER](#)

The Illinois Environmental Protection Agency's (IEPA) Office of Emergency Response (OER) maintains this Emergency Response Releases & Spills Database. The Emergency Operations Unit (EOU), within OER, coordinates IEPA's response to environmental emergencies involving oil or hazardous materials and ensures that any environmental contamination is cleaned up. EOU works with other response agencies including the Illinois Emergency Management Agency (IEMA), which is the initial contact for responses to an emergency or disaster in Illinois.

Government Publication Date: Sep 11, 2024

Dry Cleaning Facilities:

[DRYCLEANERS](#)

This list of licensed drycleaner facilities is provided by the Drycleaner Environmental Response Trust Fund of Illinois; and since July 1, 2020, is administrated by Illinois Environmental Protection Agency (IEPA).

Government Publication Date: Jul 2, 2024

Delisted Drycleaners:

[DELISTED DRYCLEANERS](#)

List of sites removed from the drycleaners database made available by the Drycleaner Environmental Response Trust Fund of Illinois.

Government Publication Date: Jul 2, 2024

IEPA Document Explorer:

[IEPA DOCS](#)

A list of permits and documents found in the Illinois Environmental Protection Agency (IEPA) Document Explorer. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are available in a digital format. This list includes records not otherwise categorized as LUST, Remediation, Air Permits, NPDES, or Compliance Commitment Agreements.

Government Publication Date: Jul 23, 2024

Clandestine Drug Labs:

[CDL](#)

List of clandestine drug lab locations made available by the Illinois Department of Public Health. The Department maintains a list of properties from reports it receives from the Illinois State Police through the Illinois Emergency Management Agency.

Government Publication Date: Jan 4, 2023

Tier 2 Report:

[TIER 2](#)

List of facilities who submit Tier II forms to the Illinois Emergency Management Agency (IEMA).

Government Publication Date: May 10, 2023

Air Permits:

[AIR PERMITS](#)

A list of sites from the Illinois Environmental Protection Agency (IEPA) Document Explorer at which one or more of the documents is in the Air Permits (construction and operating) category. The IEPA Document Explorer provides online access to numerous Illinois EPA public records which are maintained in a digital format.

Government Publication Date: Jul 23, 2024

Underground Injection Control Wells:

[UIC](#)

The Underground Injection Control (UIC) Program is a federal program established under the provision of the Safe Drinking Water Act of 1974. Since groundwater is a major source of drinking water in the United States, the UIC Program requirements were designed to prevent contamination of groundwater resulting from the operation of injection wells. The Underground Injection Well Inventory is provided by the Illinois Environmental Protection Agency. This inventory includes Class V Injections Wells which are utilized to inject non-hazardous waste into or above the Underground Source of Drinking Water.

Government Publication Date: Aug 1, 2019

Potentially Infectious Medical Waste Facilities:**MEDICAL WASTE**

Title 35 of the Illinois Administrative Code defines Potentially Infectious Medical Waste (PIMW) as waste generated in connection with the diagnosis, treatment (i.e., provision of medical services), or immunization of human beings or animals; research pertaining to the provision of medical services; or the provision or testing of biologicals. The Illinois Environmental Protection Agency's Bureau of Land is responsible for administering the PIMW program. The facilities included on this listing treat, store, transfer or dispose of PIMW.

Government Publication Date: Jun 6, 2023

Compost Facilities:**COMPOST**

The Illinois Environmental Protection Agency's Bureau of Land, Materials Management Unit maintains this list of composting facilities. Composting facilities provide an alternative option to managing and disposing of non-hazardous solid waste and/or landscape waste instead of the waste being landfilled. It is a natural form of recycling that turns some common kinds of household waste, like food and lawn wastes, into a dark organic material that can be used in a variety of beneficial ways.

Government Publication Date: Dec 1, 2023

Tribal

No Tribal additional environmental record sources available for this State.

County

No County additional environmental record sources available for this State.

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

For more location information
please visit www.strand.com

Office Locations

Ames, Iowa | 515.233.0000

Brenham, Texas | 979.836.7937

Cincinnati, Ohio | 513.861.5600

Columbus, Indiana | 812.372.9911

Columbus, Ohio | 614.835.0460

Joliet, Illinois | 815.744.4200

Lexington, Kentucky | 859.225.8500

Louisville, Kentucky | 502.583.7020

Madison, Wisconsin* | 608.251.4843

Milwaukee, Wisconsin | 414.271.0771

Nashville, Tennessee | 615.800.5888

Phoenix, Arizona | 602.437.3733

*Corporate Headquarters

