

PROJECT DOCUMENTS

VILLAGE OF KRONENWETTER

LIFT STATION 8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

ISSUE DATE:

FRIDAY, FEBRUARY 7, 2025

BID DATE:

TUESDAY, MARCH 4, 2025

RPS PROJECT NUMBER:

2023-020 (F)

ADDRESS:

**VILLAGE OF KRONENWETTER
1582 Kronenwetter Drive
Kronenwetter, WI 54455**

PREPARED BY:

ROTH PROFESSIONAL SOLUTIONS, INC.
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ADVERTISEMENT FOR BIDS KRONENWETTER LIFT STATION #8

Village of Kronenwetter
Marathon County, Wisconsin

The Village of Kronenwetter will receive sealed Bids for its Upgrade/Replacement of Lift Station #8 at the Village of Kronenwetter Office, 1582 Kronenwetter Drive, in the Village of Kronenwetter, Marathon County, Wisconsin, at the following time:

BIDS CLOSE: Tuesday, March 4 at 11:00 AM, Local Time

All Bids will be read out loud at 11:00 AM, Local Time, at the Kronenwetter Municipal Building.

Contract C - Lift Station #8, 37' Depth, Dewatering, 8' Dia. Wetwell, Above-Ground Valve Vault, 15 Hp Pumps (2), 3-Phase Power, 50 KVA Generator, 16650 LF 8" Dia. Forcemain, Air Release Manhole, Ancillary Improvements & Connections

Complete digital project bidding documents are available at www.questcdn.com and the offices of RPS as described below. You may download the digital plan documents for \$22.00 by selecting Request on the QuestCDN Page and input the Quest Request (#9514919). Contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with this digital project information. The Contractor has the option of requesting a hard-copy set of project documents for an additional fee of \$100.00. All information will be transmitted in 8 ½ x 11-page format.

Complete digital project bidding documents are available directly from the engineer, Roth Professional Solutions:

Roth Professional Solutions
Attn: Robert J. Roth, PE
315 DeWitt Street
Portage, WI 53901
(608) 571-3205
robert@rpsprofessionalsolutions.com

All bids shall be prepared on the proposal forms provided in the Project Documents and shall remain attached thereto. The Sealed Bid envelope shall be properly identified on the face thereof "SEALED BID – ***Kronenwetter Lift Station #8***".

No proposal shall be accepted unless accompanied by a certified check or bid bond equal to at least 5% of the amount bid, payable to the Owner as a guarantee that, if the bid is accepted, the bidder will execute and file the proper contract and bond within 15 days after the award of the contract. The certified check or bid bond will be returned to the bidder as soon as the contract is signed, and if after 15 days the bidder shall fail to do so, the certified check or bid bond shall be forfeited to the Owner as liquidated damages.

The Village of Kronenwetter may reject any or all bids on any basis and without disclosure of any reason. The failure to make a disclosure shall not result in accrual of any right, claim, or cause of action against the Village.

Bids may not be withdrawn prior to 60 days after the date of the Bid Opening. Upon its own full discretion, the Village of Kronenwetter reserves the right to waive any formalities or informalities in bidding and to award the Contract to the bidder who will best serve the interest of the Village.

Published by the authority of the Village of Kronenwetter:

By: Village of Kronenwetter
Jennifer Poyer
1582 Kronenwetter Drive
Kronenwetter, WI 54455
jpoyer@kronenwetter.org

00 2113 INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meaning indicated below which are applicable to both singular and plural thereof:
- A. Bidder: The individual or entity who submits a bid directly to the Owner.
 - B. Engineer: Roth Professional Solutions (RPS).
 - C. Issuing Office: The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.
 - D. Owner: Village of Kronenwetter, Marathon County, Wisconsin
 - E. Successful Bidder: The lowest responsible Bidder submitting a responsive Bid to whom the Owner on the basis of the Owner's evaluation (as hereinafter provided) makes an award.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement may be obtained from the Issuing Office. The deposit is non-refundable.
- 2.02 Complete sets of Bidding Documents must be used in preparing Bids; neither the Owner nor Engineer assumes responsibility for errors or misrepresentations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDER

- 3.01 To demonstrate Bidder's qualifications to perform the Work, within seven (7) days of the Owner's request, Bidder shall submit written evidence of financial data, previous experience, present commitments, and other such data as may be desired by the Owner. At a minimum, the following data shall be provided:
- A. Evidence of Bidder's authority to do business in the state where the Project is located.
 - B. Bidder's state or other contractor license number, if applicable.
 - C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."
 - D. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of the Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.3 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

- 4.01 Subsurface and Physical Conditions
- A. Results of road cores and subsurface geotechnical is provided in the Plans.
- 4.02 Underground Facilities
- A. There are no available reports or tests to the Engineer by the owners of the respective underground facilities, including the Owner, or others. Utilities were located as of a specified date and may not reflect

actual field conditions.

- B. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and underground facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Article 11 of the Contract the General Conditions.

4.03 Hazardous Environmental Condition

- A. There are no reports or drawings available.
- B. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Article 11 of the Contract the General Conditions.

4.04 On request, the Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. The Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such investigations, explorations, tests, and studies. The Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. For Sites in Wisconsin, any drill hole or other excavation or opening deeper than it is wide that extends more than ten feet below the ground surface shall be abandoned in accordance with Wisconsin Administrative Code Nr 812.26. An abandonment report shall be submitted to the appropriate DNR District Office within 30 days of the abandonment.

4.05 Reference is made to the Bidding Documents for the identification of the general nature of other work that is to be performed, if any, at the Site by the Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, the Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

4.06 It is the responsibility of each Bidder before submitting a Bid to:

- A. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda.
- B. Visit the Site and become familiar with and satisfy the Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Become familiar with and satisfy the Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Bidding Documents.
- E. Consider the information known to Bidder; 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 Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price

- bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. Become aware of the general nature of the work to be performed by the Owner and others at the Site, if any, that relates to the Work indicated in the Bidding Documents.
 - I. Promptly give the Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that the Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by the Engineer is acceptable to the Bidder.
 - J. Determine that the Bidding Documents are generally sufficient to indicate and convey an understanding of all terms and conditions for performance of the Work.
- 4.07 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

- 5.01 There will be no pre-bid conference for this Project.

ARTICLE 6 – SITE AND OTHER AREAS

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by the Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Contractor.

ARTICLE 7– INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Engineer in writing. Interpretations or clarifications considered necessary by the Engineer in response to such questions will be issued by Addenda mailed or *delivered* to all parties recorded by the Engineer as having received the Bidding Documents. **Questions received after February 28, 2025, at 4:00 pm may not be answered.** Only questions answered by the Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by the Owner or Engineer.
- 7.03 Where there is a discrepancy within the Contract Documents, and the Engineer does not correct the discrepancy by Addenda, the larger number, highest cost, best quality, and most restrictive shall apply.

ARTICLE 8 – BID SECURITY

- 8.01 Unless specifically stated otherwise in the Bidding Documents, a Bid must be accompanied by Bid security made payable to the Owner in the amount of five percent (5%) of the Bidder's maximum Bid price and in the form of a certified or bank check or Bid Bond issued by a surety meeting the requirements of Article 6 – Bonds and Insurance in the Contract.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, the Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be the Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom the Owner believes to have a reasonable chance of receiving the award may be retained by the

Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

ARTICLE 9 – CONTRACT TIME

9.01 The time for completion will be set forth as follows:

- A. The number of days within which, or the dates by which, the Work is to be Substantially Completed and completed and ready for final payment are outlined in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute of “equal” items. Whenever it is specified or described in the Bidding Documents that a substitute 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 considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 12.01 If the Bidding Documents required the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. 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, individual, or entity if requested by the Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract Award.
- 12.02 If the apparent Successful Bidder declines to make any such substitution, the Owner may award the Contract to the next lowest Bidder that proposed to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.
- 12.03 The Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom the contractor has a reasonable objection.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- 13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated on each section, bid item, alternate, adjustment unit price item, and unit price item listed therein. In the case of optional alternatives, the words “no Bid”, “No Change”, or “Not Applicable” may be entered.

- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistance secretary. The corporate address and state of incorporation shall be shown.
- 13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner, whose title much appear under the signature, accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.05 A bid by a limited liability company shall be executed in the name of the firm by a member 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.
- 13.06 A bid by an individual shall show the Bidder's name and official address.
- 13.07 A bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.08 All names shall be typed or printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10 Postal and email addresses and telephone numbers for communications regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. The Bidder's Wisconsin contractor license number shall be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

- 14.01 Bids may be lump sum, unit price, or combination thereof as set forth in the Bid Form.
- 14.02 Lump Sum.
 - A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the based Bid if the Owner selects the alternate.
- 14.03 Unit Price
 - A. Bidders shall submit a Bid on a unit price basis for each item of work listed in the Bid Form.
 - B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Article 5 Contract Price – in the Contract.
 - C. 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.
- 14.04 Allowances (Contingent)
 - A. For cash allowances the stated amount includes such amounts as the Bidder deems proper for the Contractor's overhead, costs, profit, and other expenses on account of cash allowances.
- 14.05 Owner Direct Purchase of Materials
 - A. The Owner wishes to exercise their right to purchase directly various construction materials, supplies, and equipment that may be a part of this contract, the Contractor will coordinate Direct Purchasing for the Owner. The Owner will, via their purchase orders, purchase the materials, and each subcontractor shall assist the Owner and Contractor in the preparation of purchase orders.
 - B. The contract/subcontract amount shall be reduced by the net, undiscounted amount of the purchase

orders, plus all sales taxes. Issuance of the purchase orders by the Owner shall not relieve the Contractor/Subcontractor of any of his responsibilities regarding material purchases, or installation, with the exception of the payments for the materials so purchased. The Contractor shall remain fully responsible for coordination, correct quantities ordered, submittal, protection, storage, scheduling, shipping, security, expediting, receiving, installation, cleaning, and all applicable warranties.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 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 and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation **"BID ENCLOSED. – KRONENWETTER LIFT STATION 8."** A mailed Bid shall be addressed as indicated within the advertisement or invitation to bid.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified 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 for opening Bids.
- 16.02 If within 24 hours after the Bids are opened any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is re-bid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened publicly at the time and place indicated in the Advertisement for Bids. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to bidders after the opening of the Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Advertisement of Invitation to Bid, but the Owner may, in its sole discretion, release any Bid and return the Bid Security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 The Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. The Owner may also reject the Bid of any Bidder that the Owner believes would not be in the best interest of the project. The Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which the Bidder has an interest.
- 19.03 In evaluating Bids, the Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of

Award.

- 19.04 In evaluating Bidders, the 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.
- 19.05 The Owner may conduct such investigations as the Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed of Subcontractors, Suppliers, and other individuals, or entities to perform the Work in accordance with the Contract Documents.
- 19.06 If the Contract is awarded, the Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.
- 19.07 Per 19.06, contracts may be awarded individually or in combination in the best interests of the Owner, including any consideration of Alternate AB.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

- 20.01 Article 6 – Bonds and Insurance in the Contract as to Performance and Payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to the Owner, it must be accompanied by the required bonds and insurance.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When the Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the agreement as attached thereto. Within 15 days thereafter, the successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to the Owner. Within ten days thereafter, the Owner shall deliver one fully signed counterpart to the successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 – SALES TAX

- 22.01 Contractor shall pay all taxes described in Article 7 – Contractor’s Responsibilities – in the Contract. ~~The Owner will pay for bulk materials on this project, or the Contractor can pay using the Owner’s account.~~

ARTICLE 23 – RETAINAGE

- 23.01 Retainage shall be five (5) percent of the amount of the completed Work. If the Work has been 50 percent completed, and if the character and progress of the Work have been satisfactory to the Owner and Engineer, the Owner, on the recommendation of the Engineer, may determine there will be no additional retainage on the Work subsequently completed as long as the character and progress of the Work remains satisfactory.
- 23.02 Retainage shall be fifteen (15) percent for materials and products on site but not incorporated into the Work.

-- END OF SECTION --

SECTION 00 4100 BID FORM & PROPOSAL

PROJECT IDENTIFICATION: LIFT STATION #8 UPGRADE PROJECT TAX INCREMENTAL FINANCE DISTRICT #2

BID DEADLINE: TUESDAY MARCH 4, 2025; 11:00 AM

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

**Village of Kronenwetter
Municipal Building
1582 Kronenwetter Drive
Kronenwetter, WI 54465**

1.02 The undersigned Bidder(s) 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

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty days after the day of Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of the Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum Number	Date of Addendum
1	February 26, 2025
2	February 28, 2025

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all:

- (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in the Bidding documents as containing reliable technical data, and
 - (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Bidding Documents as containing reliable technical data.
- E. Bidder has considered the information known to bidder: 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 any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on:
- (1) the cost, progress, and performance of the Work;
 - (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and
 - (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 3.01 (E) above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. 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.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – FURTHER REPRESENTATIONS

4.01 Bidder further represents that:

- 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 a 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; and
- 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:
 - (i) To influence the bidding process to the detriment of Owner,
 - (ii) To establish bid prices at artificial non-competitive levels,
 - (iii) 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. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 5 – BASIS OF BID

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

Item No.	Bid Item	Estimated No. of Units	Measurement Units	Unit Price	Total Bid Amount
1	Performance and Payment Bonds	----	Lump Sum	---- 20,000	\$ 20,000
2	Mobilization	----	Lump Sum	---- 200,000	\$ 200,000
3	Erosion Control Silt fence & Maintenance During Construction	1,871	LF	\$ 4 -	\$ 7484 -
4	Erosion Control Silt Sock & Maintenance During Construction	1,573	LF	\$ 10 -	\$ 15,730 -
5	Erosion Control Dewatering basin & Maintenance During Construction	1	EA	\$ 24,000 -	\$ 24,000 -
6	Erosion Control access gravel pads & Maintenance During Construction	2	EA	\$ 2500 -	\$ 5000 -
7	Erosion Control access Inlet protections & Maintenance During Construction	4	EA	\$ 250 -	\$ 1000 -
8	Unclassified Excavation-Non-Paved Areas At Lift Station Site	110	CY	\$ 30 -	\$ 3300 -
9	Remove Asphalt Pavement at Lift Station Site	32	SY	\$ 20 -	\$ 640 -
10	Sawcut Asphalt Pavement at Lift Station Site	30	LF	\$ 10 -	\$ 300 -
11	Topsoil Handling	14,570	SY	\$ 1 -	\$ 14,570 -
12a	Lift Station Complete, Wetwell Structure, Fiberglass AGVV Enclosure, Transducer, Floats, LS Piping, Hatch, Guide Rails, Hangers, & Pumps, Valves, Quick Connect	1	LS	---- 265,000	\$ 265,000 -
12b	Lift Station Control Panel, Junction Boxes & Controls & Wiring with AGVV Configuration, Including VFD & Telemetry	1	LS	---- 36,500	\$ 36,500 -
13	8' Diameter Wetwell Excavation & Installation, Placement Backfill, Dewatering & Waterproofing	1	LS	---- 420,000	\$ 420,000 -
14	Granular Backfill for Lift station	50	CY	\$ 100 -	\$ 5000 -
15	Generator - 40 KW for 15 Hp Pump & Station Ancillaries, Installation Complete	1	LS	---- 46,500	\$ 46,500 -
16	Generator - ATS & Installation Complete	1	LS	---- 7500	\$ 7500 -
17	Abandon Existing Electrical Systems - Complete	1	LS	---- 1000	\$ 1000 -
18	Abandon Existing Lift Station Structure - Complete	1	LS	---- 10,000	\$ 10,000 -
19	3/4" CABC for Roadway, 10" thick	40	SY	\$ 50	\$ 2000 -
20	Relocate Hydrant, Lead & Valve @ Lift Station	1	LS	---- 8000	\$ 8000 -
21	HMA 4LT 58-28-S Asphalt Pavement, Lift Station & Old 51 Driveways, 4"	30	TN	\$ 305 -	\$ 9150 -
22	Hot Tar tack coat	20	Gal	\$ 12 -	\$ 240 -
23	3/4" CABC for Drive Shoulder, 2' wide x 6" thick	5	CY	\$ 100 -	\$ 500
24	Concrete Pads (3) - Generator, Transformer	8	CY	\$ 500 -	\$ 4000
25	Gas Meter Stand and ATC & Meter Stand	2	EA	---- 2500	\$ 5000 -
26	Topsoil, Seed & E-Mat all Disturbed Areas	15000	SY	\$ 5 -	\$ 75,000 -
27	Install Base, Pole, Fixture Light	1	EA	\$ 5100 -	\$ 5100 -
28	Electrical Feed to Yard Light, Connection	15	LF	\$ 20 -	\$ 300 -
29	12" DI San Sewer @ Lift Station	18	LF	\$ 220 -	\$ 3960 -
30	12" PVC SDR 21 @ Lift Station	49	LF	\$ 190 -	\$ 9310 -

31	8" FM C900 DR18 Pipe (Open Cut)	16649	LF	\$ 80 -	\$ 1,332,000 -
32	8" FM Trench In-Situ Trench Backfill/Compaction	16391	LF	\$ 8 -	\$ 132,000 -
33	Bore 21" steel casing bore under I-39, Including 8" FM	258	LF	\$ 900 -	\$ 232,200 -
34	Air release Valve & Manhole Complete	1	LS	--- 26,500 -	\$ 26,500 -
35	Granular Fill/Compaction for Air Relief MH Site	10	CY	\$ 100 -	\$ 1000 -
36	Driveway 18' x 25' for Air Relief MH Site, Complete (Grading, Fill, WisDOT Fence, & Gravel)	1	LS	--- 5000	\$ 5000
37	Insulation (4x8x2") over FM @ Culverts per Plan	1,800	LF	\$ 12 -	\$ 21,600
38	Depth Exploration for Water Line @ Kowalski Road, Match Existing Pavement, Base, when Restoring	1	LS	--- 5000	\$ 5000 -
39	277/480V 3-Phase Power Extension and Setup Allowance	1	ALLOWANCE	---	\$5,000
40	Replace Ex. Sanitary Sewer Manhole #7-35, Complete. (Includes Structure, Connection, Drop MH Configuration, Coatings)	1	LS	--- 10,000 -	\$ 10,000 -
41	Bypass Pumping MH #7-35	1	LS	--- 5000 -	\$ 5000 -
42	Gas Connection Allowance	1	ALLOWANCE	---	\$2,500
43	Tele/Internet Connection Allowance	1	ALLOWANCE	---	\$2,500
44	WisDOT Fence Removal, Reinstall	250	LF	\$ 26 -	\$ 6500 -
45	Directional Bore @ Kowalski Road including Pit excavation	307	LF	\$ 170 -	\$ 53,190 -
46	Road Restoration at Bore Pit Location	1	LS	--- 5000 -	\$ 5000 -
47	Topsoil, Seed & E-Mat Bore Pit Location	70	SY	\$ 12 -	\$ 840 -
48	Pigging Pipe Unit- Piping, Pigg, & Install Complete	1	LS	26,000 -	26,000 -
49	Fall Protection Support Materials & Installation	1	LS	--- 5000	\$ 5000 -

Total Base Bid

\$ 3,080,962 -

ALTERNATE A – Open cut Crossing Kowalski Rd

Item No.	Bid Item	Estimated No. of Units	Measurement Units	Unit Price	Total Bid Amount
A1	Administrative - Base Bid less items 38, 45, 46, & 47	----	----	----	(\$3,063,642) -
A2	Traffic Control	1	LS	\$ 5000 -	\$ 5000 -
A3	Unclassified Excavation-Non Paved Areas	50	CY	\$ 25 -	\$ 1250 -
A4	Remove Asphalt Pavement	300	SY	\$ 5 -	\$ 1500 -
A5	Sawcut Asphalt Pavement	800	LF	\$ 4 -	\$ 3200 -
A6	Topsoil removal	100	SY	\$ 5 -	\$ 500 -
A7	3/4" Crushed Aggregate for roadway, 8" thick	330	SY	\$ 10 -	\$ 3300 -
A8	3" Breaker Run for Roadway, 6" thick	300	SY	\$ 8.50	\$ 2550 -
A9	HMA Asphalt Pavement 4" Surface Course	72	TN	\$ 220 -	\$ 15,840 -
A10	Hot Tar Butt Joint Sealer	386	LF	\$ 10 -	\$ 3860
A11	Concrete Curb & Gutter-Match Existing	110	LF	\$ 65 -	\$ 7150 -
A12	Topsoil, Seed & E-Mat all Disturbed areas,	100	SY	\$ 12 -	\$ 1200 -
A13	Hot Tar Tack Coat	30	Gal	\$ 12 -	\$ 360 -

Total Contract Utilizing Alternate A

\$ 3,63,642

ALTERNATE B – Boring in Forcemain along Kronenwetter Dr.

Item No.	Bid Item	Estimated No. of Units	Measurement Units	Unit Price	Total Bid Amount
B1	Administrative - Base Bid less items 31,32 by 15000 LF	----	----	----	(\$1,320,000)
B2	Direction boring C900-dr18 pipe with Mech Joint Fasteners	15,000	LF	\$ 75-	\$1,125,000

Total Contract Utilizing Alternate B

\$ 2,868,642-

ALTERNATE C – Panel Change Deduct

Item No.	Bid Item	Estimated No. of Units	Measurement Units	Unit Price	Total Bid Amount
C1	Administrative - Base Bid less Nema 4x panel	----	----	----	(\$308,962)
C2	Nema 4 Panel Boxes	1	LS	\$ 1200	\$ 1200

Total Contract Utilizing Alternate C

\$ 308,662

Bidder acknowledge that: (1) Each Bid Unit price includes an amount considered by Bidder to be adequate to cover Contractor's Overhead and profit for each separately identified item; and (2) estimated quantities are not guaranteed; and are solely for the purpose of comparison of Bids; and final payment for all unit price Bids will be actual quantities determined as provided in the Contract Documents; and (3) Contractor to prepare for the Town of Delton a material list to be purchased by the town.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Article 4 – Contract Times of the Contract as follows:

Contract Items	Estimated NTP	Substantial Completion	Final Completion
31 (Forcemain)	April 4, 2025	June 15, 2025	December 15, 2025
12b, 15 & 16 (Adjusted Lead Time)	April 4, 2025	May 15, 2026	June 15, 2026
Remaining Items	April 4, 2025	December 15, 2025	December 30, 2025
Successful Station Start-up	----	July 1, 2026	July 15, 2026

- 6.02 Bidder accepts the provision for liquidated damages in the amount of \$100.00 for each day that expires after the date of substantial completion and until the Work is substantially complete; and liquidated damages in the amount of \$100.00 for each day that expires after the date of final completion until the Work is complete.

ARTICLE 7- ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of bid:

- A. Required Bid Security in the form of a Bid Bond or Certified Check payable to the Owner.
- B. List of Project References;
- C. List of Proposed Subcontractors;
- D. List of Proposed Suppliers and suppliers quote see Article 7 -Contractors Responsibilities and specifications included herein.
- E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids; and
- F. Contractor's License No. 848817 or 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 – COMMUNICATIONS

9.01 Communications concerning this Bid shall be addressed to:

Name	Dan De Boer, Earth, Inc.
Address	4362 Dairy Road, Arpin WI 54410
Phone	715. 652. 2522
FAX	715. 652. 3493
Email Address	estimating.earth@tds.net
Cell Phone	715. 652. 1873 (direct)

ARTICLE 9 – BID SUBMITTAL

10.01 This Bid is submitted by:

An Individual:

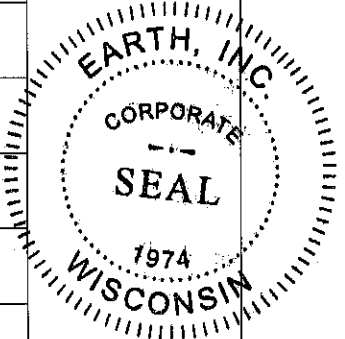
Name (Typed or Printed)		(Seal)
By (Signature of Individual)		
Doing Business As		
Business Address		

A Partnership:

Partnership Name (Typed or Printed)		(Seal)
-------------------------------------	--	--------

By (Signature of General Partner, Attach Evidence)		
Name (Typed or Printed)		
Business Address		

A Corporation:

Corporation Name (Typed or Printed)	Earth, Inc.	
State of Incorporation	Wisconsin	
By (Signature of General Partner, Attach Evidence)	<i>Dan DeBoer</i>	
Name (Typed or Printed)	Dan De Boer	
Title	President	
Attest (Signature of Corporate Secretary)	<i>[Signature]</i>	
Business Address	4362 Dairy Road, Argon WI 54410	(Seal)

A Limited Liability Company:

LLC Name (Typed or Printed)		
State of Registration		
By (Signature of General Partner, Attach Evidence)		
Name (Typed or Printed)		
Title		
By (Attach Evidence of Authority to Sign)		
Name (Typed or Printed)		
Title		
Business Address		(Seal)

-- END OF SECTION --

LIST OF REFERENCES

The Bidder is required to provide a list of three (3) projects and corresponding references for those projects which have been completed by the Bidder in the recent past and are similar to this Project in scope of Work and cost.

(1) Name/Owner of Project:

Description of Project: Greenwood + Northwestern Lift Stations

- Lift station Rebuild + association connections,
pipings, + pumps/controls

Project Cost: ~\$2,000,000

Contact Reference: Diane Thune (Clark-Dietz) or Ben Brooks (City Wastewater)

Telephone No.: 715.841.9796 715.261.6530

(2) Name/Owner of Project:

Description of Project: CTH R Sewer Collector

Installation of deep sewer pipe (20'-25' depth)
and related structures

Project Cost: ~\$2 million

Contact Reference: Bob Buerger (AECOM) or Steve Knust (Village Administrator)

Telephone No.: 715.342.8110 715.345.5250

(3) Name/Owner of Project:

Description of Project: Storm / Utility Reconstruction + Sanitary Sewer

Project Cost: ~\$2,000,000

Contact Reference: Tim Cassidy (Engineer for City of Marshfield)

Telephone No.: 715.486.2034

LIST OF SUBCONTRACTORS

The following is a complete list of all Subcontractors, in which the Bidder expects to employ, and the category of Work to be performed by each on the Project, if the Bidder is awarded a Contract. This list of Subcontractors shall not be changed without the prior written approval of the Owner. If no Subcontractors are intended to be utilized, please state "None."

SUBCONTRACTOR

CATEGORY OF WORK

- 1) Rent A Flash of WI Traffic Control
- 2) American Asphalt of WI Asphalt Paving
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____



State of Wisconsin

Department of Financial InstitutionsSearch for:
earth inc**Search Records**[Search](#)
[Advanced Search](#)
[Name Availability](#)**Corporate Records**Result of lookup for **1E09324** (at 3/4/2025 8:12 AM)**EARTH, INC.**You can: [File an Annual Report](#) - [Request a Certificate of Status](#) - [File a Registered Agent/Office Update Form](#)**Vital Statistics**

Entity ID 1E09324

Registered Effective Date 08/08/1974

Period of Existence PER

Status Restored to Good Standing [Request a Certificate of Status](#)

Status Date 09/29/1999

Entity Type Domestic Business

Annual Report Requirements Business Corporations are required to file an Annual Report under s.180.1622 WI Statutes.

Addresses

Registered Agent Office SKYLER DE BOER
4362 DAIRY RD
ARPIN , WI 54410-9710

[File a Registered Agent/Office Update Form](#)

Principal Office 4362 DAIRY RD
ARPIN , WI 54410-9710

Historical Information**Annual Reports**

Year	Reel	Image	Filed By	Stored On
2024	000	0000	online	database
2023	000	0000	online	database
2022	000	0000	online	database
2021	000	0000	online	database

2020	000	0000	online	database
2019	000	0000	online	database
2018	000	0000	online	database
2017	000	0000	online	database
2016	000	0000	online	database
2015	000	0000	online	database
2014	000	0000	online	database
2013	000	0000	online	database
2012	000	0000	online	database
2011	000	0000	online	database
2010	000	0000	online	database
2009	000	0000	online	database
2008	000	0000	online	database
2007	000	0000	online	database
2006	000	0000	online	database
2005	000	0000	online	database
2004	000	0000	online	database
2003	000	0000	online	database
2002	000	0000	online	database
2001	000	0000	online	database
2000	023	0259	paper	microfilm
1999	021	2065	paper	microfilm
1997	020	1881	paper	microfilm
1996	023	1161	paper	microfilm
1995	016	1583	paper	microfilm
1994	023	0269	paper	microfilm
1993	021	0091	paper	microfilm

[File an Annual Report](#) - [Order a Document Copy](#)

Certificates of Newly-elected Officers/Directors

Year	Reel	Image	Filed By	Stored On
2023	222	2222	paper	image

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Old Names

Change Date	Name
Current	EARTH, INC.
09/10/1975	DE BOER - ASHBECK EXCAVATING, INC.

Chronology

Effective Date	Transaction	Processed Date	Description
08/08/1974	Incorporated/Qualified/Registered	08/08/1974	
09/10/1975	Amendment	09/10/1975	CHG NAME

08/16/1988	Change of Registered Agent	08/16/1988	
07/01/1999	Delinquent	07/01/1999	
09/29/1999	Restored to Good Standing	09/29/1999	
09/12/2001	Change of Registered Agent	09/12/2001	FM16-E-Form
11/14/2007	Statement of Correction	11/14/2007	2007 E-FILED ANNUAL REPORT
07/24/2017	Change of Registered Agent	07/24/2017	Form16 OnlineForm
04/13/2023	Change of Registered Agent	04/13/2023	FM13-E-Form

[Order a Document Copy](#)



4362 Dairy Road • ARPIN WI 54410
(715) 652-2522 • (715) 652-3493

April 1, 2024

Corporate President, Dan DeBoer, has the authority to sign bid documents and authority to bind organization to agreements.

Corporate Vice President, Jerad de Boer, has the authority to sign bid documents and authority to bind organization to agreements.

Corporate Sec./Treas. Skyler de Boer, has the authority to sign bid documents and authority to bind organization to agreements.

Signed:

Dan DeBoer
President/CEO

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

Earth, Inc.
4362 Dairy Rd
Arpin, WI 54410

SURETY:

(Name, legal status and principal place of business)

Western Surety Company
151 N Franklin St
Chicago, IL 60606

OWNER:

(Name, legal status and address)

Village of Kronenwetter
1582 Kronenwetter Drive
Kronenwetter, WI 54455

BOND AMOUNT: Five Percent of the Amount Bid (5%)

PROJECT:

(Name, location or address, and Project number, if any)

Lift Station 8 Upgrade Project; Kronenwetter, WI

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 4th day of March, 2025


(Witness) Skylar de Bra

(Witness) Jenny L. Huth

Earth, Inc.

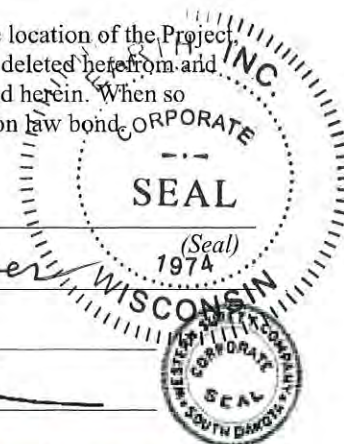
(Contractor as Principal)

(Title)

Western Surety Company

(Surety)

(Title) Jay A. Zahn, Attorney-in-Fact



CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

Init.

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ACD43070810

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Jenny L. Hirth, Patrick A. McKenna, Kathryn A. Weidner, Jay A. Zahn, Lynn E. Potter, Individually

of Madison, WI, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the Authorizing By-Laws and Resolutions printed at the bottom of this page, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 26th day of March, 2024.



WESTERN SURETY COMPANY

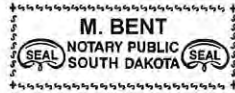
Larry Kasten, Vice President

State of South Dakota }
County of Minnehaha } ss

On this 26th day of March, 2024, before me personally came Larry Kasten, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is a Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

March 2, 2026



M. Bent, Notary Public

CERTIFICATE

I, Paula Kolsrud, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law and Resolutions of the corporation printed below this certificate are still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 4th day of March, 2025



WESTERN SURETY COMPANY

Paula Kolsrud, Assistant Secretary

Authorizing By-Laws and Resolutions

ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.

This Power of Attorney is signed by Larry Kasten, Vice President, who has been authorized pursuant to the above Bylaw to execute power of attorneys on behalf of Western Surety Company.

This Power of Attorney may be signed by digital signature and sealed by a digital or otherwise electronic-formatted corporate seal under and by the authority of the following Resolution adopted by the Board of Directors of the Company by unanimous written consent dated the 27th day of April, 2022:

"RESOLVED: That it is in the best interest of the Company to periodically ratify and confirm any corporate documents signed by digital signatures and to ratify and confirm the use of a digital or otherwise electronic-formatted corporate seal, each to be considered the act and deed of the Company."

Go to www.cnasurety.com > Owner / Obligor Services > Validate Bond Coverage, if you want to verify bond authenticity.

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.

**AGREEMENT
BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT
(STIPULATED PRICE)**

Prepared by



Issued and Published Jointly by



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347-7474
www.acec.org

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NOTICE OF AWARD

Date of Issuance:	March 13, 2025	Contract Name:	VILLAGE OF KRONENWETTER LIFT STATION 8
		Contract No.:	2023-020 (F), Alternate B
Owner:	Village of Kronenwetter 1582 Kronenwetter Drive	Contractor:	Earth, Inc.
Owner Address:	Kronenwetter, WI 54455	Bidder's/ Contractors Address	4362 Dairy Road Arpin, WI 54410
Engineer:	Roth Professional Solutions		

TO BIDDER:

You are notified that the Owner has accepted your bid on Tuesday 3/4/2025 for the above Contract and that you are the Successful Bidder and are awarded a Contract for: 2023-20 (F) Lift Station #8 Upgrade Project, Alternate B

The Contract Price of the awarded Contract is \$ 2,885,962.00

Three (3) unexecuted counterparts of the Agreement and the Contract Documents accompany this Notice of Award.

You must comply with the following conditions precedent within 10 days of the date of receipt of this Notice of Award:

1. Deliver to Owner three (3) counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreements the Contract security [e.g., Performance and Payment bonds and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.

Failure to comply with these conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, the Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner **Village of Kronenwetter**

By: Dan DeBoer
Title: President

Date 4-4-25

CC: Roth Professional Solutions / 315 DeWitt Street / Portage, WI 53901/ robert@rpsprofessionalsolutions.com)

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between **THE VILLAGE OF KRONENWETTER** ("Owner") and

Owner and Contractor hereby agree as follows: **EARTH, INC.** ("Contractor").

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, of which the Work under the Contract Documents is a part, is generally described as follows:

VILLAGE OF KRONENWETTER LIFT STATION 8

ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by Roth Professional Solutions, Inc.
- 3.02 The Owner has retained Roth Professional Solutions, Inc. ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

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 Contract Times: Dates

Contract Items	Estimated NTP	Substantial Completion	Final Completion
31 (Forcemain)	April 4, 2025	June 15, 2025	December 15, 2025
12b, 15 & 16 (Adjusted Lead Time)	April 4, 2025	May 15, 2026	June 15, 2026
Remaining Items	April 4, 2025	December 15, 2025	December 30, 2025
Successful Station Start-up	---	July 1, 2026	July 15, 2026

- 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 times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. 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 \$ 100.00 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.
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 \$ 500.00 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain 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 equal to the sum of the amounts determined pursuant to the paragraphs below:
- For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that item as stated in Contractor's Bid, attached hence to as Exhibit A.

The Bid prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6 – PAYMENT PROCEDURES

- 6.01 Submittal and Processing of Payments
- A. The owner has elected to forgo Performance and Payment Bonds Bid Item number 1, Instead the exercise the retainage clause in Paragraph 6.02 B below will be exercised.
- 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 on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in 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 elsewhere in the Contract.
- B. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in 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 elsewhere in the Contract.
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. 95 percent of Work completed (with the balance being retainage); and
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- C. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 97.5 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of Engineer's estimate of the value of

Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

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.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 6 percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. 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 Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
 - F. 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.
 - G. 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.
 - H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. 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.

ARTICLE 9 – CONTRACT DOCUMENTS

- 9.01 Contents
 - A. The Contract Documents consist of the following:

1. This Agreement (Pages 1-5 inclusive + Amendment No. 1)
 2. Notice to Proceed (1 page)
 3. General Conditions (Pages 1-76 inclusive)
 4. Supplementary Conditions (Pages 1-6 inclusive)
 7. Specifications Listed in the Table of Contents of the Project Documents.
 8. Drawings as Listed in the Table of Contents of the Project Documents.
 9. Addendums, if any
 10. Exhibits to this Agreement:
 - a. Bid Form & Proposal (00.41.00 9 pages)
 - b. Disclosure of Ownership (00.45.46 1 page)
 11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Written Amendments
 - b. Work Change Directives.
- B. The 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 the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto 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 Documents.

10.03 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.

10.04 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.

10.05 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 10.05:
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.

10.06 Other Provisions

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

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

OWNER: VILLAGE OF KRONENWETTER

By:

Title:

Attest:

Title:

Address for giving notices:

CONTRACTOR:

By:

Title:

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

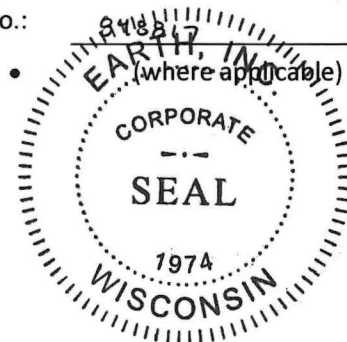
Attest:

Title:

Address for giving notices:

4362 Dairy Road, Argon WI 54410

License No.:



PERFORMANCE BOND

CONTRACTOR (name and address):

Earth, Inc.
4362 Dairy Rd
Arpin, WI 54410

SURETY (name and address of principal place of business):

Western Surety Company
151 N Franklin St
Chicago, IL 60606

OWNER (name and address): Village of Kronenwetter
1582 Kronenwetter Drive
Kronenwetter, WI 54455

CONSTRUCTION CONTRACT

Effective Date of the Agreement: March 13, 2025

Amount: Two Million Eight Hundred Eighty Five Thousand Nine Hundred Sixty Two & 00/100 (\$2,885,962.00)

Description (name and location): Village of Kronenwetter Lift Station 8,
Contract No. 2023-020 (F), Alternate B, Kronenwetter, WI

BOND

Bond Number: 30225593

Date (not earlier than the Effective Date of the Agreement of the Construction Contract): March 26, 2025

Amount: Two Million Eight Hundred Eighty Five Thousand Nine Hundred Sixty Two & 00/100 (\$2,885,962.00)

Modifications to this Bond Form: ☒ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Earth, Inc.

Contractor's Name and Corporate Seal

By:

Dan DeBoer
Signature

Dan De Boer
Print Name

President
Title

Attest:

[Signature]
Signature

Corporate Secretary
Title

SURETY

Western Surety Company

Surety's Name and Corporate Seal

By:

[Signature]
Signature (attach power of attorney)

Jenny L. Hirth
Print Name

Attorney-in-Fact
Title

Attest:

[Signature]
Signature

Witness, Jay A. Zahn
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

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 shall 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 shall 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 shall 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 shall 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 shall 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 shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall 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 shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

12. No suit or action shall 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 shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall 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 shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall 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:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
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;
4. A brief description of the labor, materials, or equipment furnished;
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;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and

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 shall be 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 shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows: None



EARTINC-01

KCANAVAN

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

3/28/2025

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 have ADDITIONAL INSURED provisions or 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 Marshfield Insurance Agency 208 West 5th Street Marshfield, WI 54449	CONTACT NAME: Kristi Canavan	
	PHONE (A/C, No, Ext): (715) 502-2897	FAX (A/C, No): (715) 384-4332
INSURED Earth Inc Earth Transport Inc 4362 Dairy Rd Arpin, WI 54410	E-MAIL ADDRESS: kristi.canavan@marshfieldinsurance.net	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A : Acuity Insurance	
	INSURER B :	
	INSURER C :	
	INSURER D :	
INSURER E :		
INSURER F :		
NAIC #		
14184		

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.

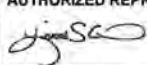
INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR ☒ Contractual Liab. GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PROJECT ☐ LOC OTHER:	X		668027	4/20/2024	4/20/2025	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 500,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 3,000,000 PRODUCTS - COM/OP AGG \$ 3,000,000
A	☒ AUTOMOBILE LIABILITY ☒ ANY AUTO OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY	X		668027	4/20/2024	4/20/2025	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
A	☒ UMBRELLA LIAB ☒ OCCUR ☒ EXCESS LIAB ☐ CLAIMS-MADE DED ☒ RETENTION \$ 0	X		668027	4/20/2024	4/20/2025	EACH OCCURRENCE \$ 10,000,000 AGGREGATE \$ 10,000,000
A	☒ WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below Y/N N/A		N/A	668027	4/20/2024	4/20/2025	☒ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A	Installation Floater			668027	4/20/2024	4/20/2025	Ded-\$500 600,000
A	Non-Owned Equipment			668027	4/20/2024	4/20/2025	Ded-\$500 450,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Project: Kronenwetter Lift Station #8 Upgrade
Village of Kronenwetter and Roth Professional Services are additional insureds with regard to General Liability & Auto Liability, when required by written contract, with the umbrella following form.

CERTIFICATE HOLDER

CANCELLATION

Village of Kronenwetter 1582 Kronenwetter Dr Kronenwetter, WI 54455	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 

NOTICE TO PROCEED

Owner: VILLAGE OF KRONENWETTER

Owner's Contract No.: **2023-020 (F)**

Contractor: EARTH, INC.

Engineer: RPS Professional Solutions, Inc.

Engineer's Project No.: 2023-020 (F)

Project: KRONENWETTER LIFT STATION 8

Contract Name: KRONENWETTER LIFT STATION 8

Effective Date of Contract: MARCH 13, 2025

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on

On that date, the Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date without the Owners written approval. In accordance with the Agreement, the date of Substantial Completion is:

Contract Items	Estimated NTP	Substantial Completion	Final Completion
31 (Forcemain)	April 4, 2025	June 15, 2025	December 15, 2025
12b, 15 & 16 (Adjusted Lead Time)	April 4, 2025	May 15, 2026	June 15, 2026
Remaining Items	April 4, 2025	December 15, 2025	December 30, 2025
Successful Station Start-up	----	July 1, 2026	July 15, 2026

Before starting any Work at the Site, the Contractor must comply with the following:

N/A

Owner: _____



Authorized Signature

By: _____

Robert J. Roth

Title: _____

Project Engineer

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



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting 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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree 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 the 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. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *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.
36. *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.

37. *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 furnished by Owner which are designated for the use of Contractor.
38. *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.
39. *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.
40. *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 thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, 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.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.

48. *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 the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. 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:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. 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 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean 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, shall mean 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, shall mean 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. 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 Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), 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 executed 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 specifically 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 *Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items 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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one 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 or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, 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, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Documents 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 Documents 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 shall 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 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 thereunder.
- 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 give written notice to Owner and Contractor 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 editions, 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. 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.
- E. Paragraph 8.03 governs 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.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times 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.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor 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; 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 7.12, 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 at law; 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 shall 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 known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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 upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 - 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.

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 either:
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; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not shown or indicated 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), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; 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 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. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, 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.
- 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 or 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.H shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall 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 Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. 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, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *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:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall 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, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. 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 CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims 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 shall be written on an occurrence basis.
- E. *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. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *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 shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed 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.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *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 full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. 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 may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. 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.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. 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).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed 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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers 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. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend 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. 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:
 - 1. loss 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 perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *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 at all times maintain good discipline and order at the Site.
- B. 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 shall 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.

7.03 *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 shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall 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 shall 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.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, 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 material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it 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) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it 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 shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity 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 five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create 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.

7.07 *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 a particular 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 shall be disclosed by Owner 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. 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

7.09 *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.

7.10 *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. Except where otherwise expressly required by applicable Laws and Regulations, 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *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. 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.
- B. 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. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when 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.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. 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.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.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).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall 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.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of 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 threatened 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 thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified 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
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall 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 submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will 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.D.

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.D.

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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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, conform to the information given in 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 shall 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.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.

E. *Resubmittal Procedures:*

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 submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper 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.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 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. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. 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 shall 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 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 performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury 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 shall 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.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner 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, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.

- D. 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 shall 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 Documents (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 10.08. 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 *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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

10.08 *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, shall 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 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* 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 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate 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.

11.03 *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.

11.04 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or
 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 11.04.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 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall 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 shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five 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 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. 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. The supporting data shall 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. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 shall be submitted 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; and
 - 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, 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, shall 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 shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall 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, who 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 shall 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 for services specifically related to the Work.
5. Supplemental costs including 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, and hand tools not owned by the workers, 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.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the 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 property insurance established in accordance with Paragraph 6.05), 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 shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall 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 shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. 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.
- 5. 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:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

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 on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall 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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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 will 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 therewith 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 shall 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 shall 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 shall 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 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 shall 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 special 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, or both, 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 shall 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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven 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 on account of 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. 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 shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and 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.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;
 - l. there are other items entitling 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 shall 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 shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall 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 seven 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*

1. 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 ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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. *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.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- 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 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then 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 other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, 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 therefrom.
- B. If 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 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 correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. 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.
- D. 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.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall 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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven 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 on account of loss of anticipated overhead, profits, or revenue, 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 seven 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, seven 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; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising 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; or
 - 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 Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

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 shall not constitute a waiver of that provision, nor shall 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 or completion of the Contract or termination 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 *Headings*

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

SUPPLEMENTARY CONDITIONS

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These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

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.

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.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

Geotechnical Report — The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner. The report's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. If opinions, or interpretive or speculative non-factual comments or statements appear in this document, such opinions, comments, or statements are not operative parts of the report and do not have contractual standing. Subject to that exception, the report is a Contract Document.

ARTICLE 2 – PRELIMINARY MATTERS

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 copies of the Contract Documents (including one fully executed counterpart of the Agreement).

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Intent

Delete paragraph 3.01C in its entirety.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

Add the following new paragraphs immediately after Paragraph 5.03.B:

- C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:
 - 1. Geotechnical report dated August 1, 2014, prepared by CGC, Inc., West Allis, WI, 54214, consisting of 34 pages. The Technical Data contained in such report upon whose accuracy Contractor may rely are set forth in the definition of Technical Data in the General Conditions.
- D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) are known to Owner:
None
- E. Copy of the geotechnical report identified in SC 5.03.C is included with the Bidding Documents.

SC-5.06 Hazardous Environmental Conditions

Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

Add the following sentence at the end of paragraph 6.01F:

Owner may furnish to any Subcontractor, Supplier or Contractor's Bonding Company, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.03 Contractor's Insurance

Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Worker's Compensation Insurance and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions. Prime Contractors are required to provide Workmen's Compensation Insurance for the duration of this project meeting statutory requirements. Prime Contractors shall require subcontractors to provide Workmen's Compensation Insurance for all subcontractor employees working on this project, unless covered by Prime Contractor's policy.

Employer's Liability	\$500,000
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Projects in Wisconsin constructed by out-of-state contractors or subcontractors must be so endorsed on the policy and noted on the certificate.

2. Contractor's General Liability Insurance under Paragraphs 5.04.A.3 through A.6 of the General Conditions. This policy shall be provided by and in the name of each Prime Contractor and shall include completed operations and product liability coverages, and independent Contractor's Contingent coverage. Minimum limits:

\$1,000,000	Each Person
\$1,000,000	Each Occurrence
\$2,000,000	General Aggregate

Delete exclusions for X-C-U (Explosion, Collapse, and Underground) perils and any exclusion with respect to property under the care, custody and control of the Contractor.

3. Automobile Liability Insurance. This policy shall be provided by and in the name of each Prime Contractor. Coverage shall include all owned, non-owned, and hired vehicles. Prime Contractors shall require similar coverages by subcontractors. Minimum Limits:

Bodily Injury	\$1,000,000	Each Person
	\$1,000,000	Each Occurrence
Property Damage	\$1,000,000	Each Occurrence
Combined Single Limit	\$1,000,000	

4. Contractual Liability. Coverage required by Paragraph 5.04.B.4 of the General Conditions. Minimum limits.

Bodily Injury	\$2,000,000	Each Person
	\$2,000,000	Each Occurrence
Property Damage	\$2,000,000	Each Person
	\$2,000,000	Annual Aggregate

5. Umbrella Coverage. This policy shall be provided by and in the name of each Prime Contractor. Coverage shall include all the categories above and shall be for the following minimum limits: \$5,000,000, each occurrence and general aggregate.

6. Contractor's Pollution Liability:

Each Occurrence	\$N/A
General Aggregate	\$N/A

☒ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

For purposes of these requirements additional insureds shall be:

the OWNER: VILLAGE OF KRONENWETTER

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

Delete Paragraph 7.02 B. in its entirety, and insert the following:

- B. In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.

Add the following new paragraph immediately after Paragraph 7.02.B:

Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the 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.

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

SC-13.03 Unit Price Work

Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
1. if the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 15 percent from the estimated quantity of such item indicated in the Agreement; and
 2. if there is no corresponding adjustment with respect to any other item of Work; and
 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

Add the following new paragraph immediately after Paragraph 17.01:

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.
- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 - 1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and
 - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

SC-17.03 Attorneys' Fees

Add the following new paragraph immediately after Paragraph 17.02.

SC-17.03 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

SECTION 00 7300

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

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.

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.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

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

- B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. Evidence of Owner's Insurance: After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner 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

SC-2.02.A. Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor [3] copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor [3] copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate \$ 2,000,000

Products - Completed Operations Aggregate \$ 2,000,000

Personal and Advertising Injury \$ 1,000,000

Each Occurrence (Bodily Injury and Property Damage) \$ 1,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Combined Single Limit of \$ 1,000,000

4. Excess or Umbrella Liability:

Per Occurrence \$ 1,000,000

General Aggregate \$ 1,000,000

5. Contractor's Pollution Liability:

Each Occurrence \$ n/a

General Aggregate \$ n/a



If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: None.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Wisconsin and of cities and counties thereof 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 construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 8 – OTHER WORK AT THE SITE

SC-8.02 Delete Paragraph 8.02.A in its entirety.

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

SC 13.03.E Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
 - 1. if the extended price of a particular item of Unit Price Work amounts to 20 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 10 percent from the estimated quantity of such item indicated in the Agreement; and
 - 2. if there is no corresponding adjustment with respect to any other item of Work; and
 - 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

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

SC 15.03.B Add the following new subparagraph to Paragraph 15.03.B:

- 4. 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, shall 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 Article 15.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the rules of a selected arbitration agency, subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.

- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 - 1. The inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and
 - 2. Such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

SC-17.03 Attorneys' Fees

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02.

SC-17.03 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

01 1000 PROJECT DESCRIPTION & SPECIAL CONDITIONS

A. BACKGROUND

1. DESCRIPTION. This specification includes background information on the Village of Kronenwetter Lift Station 8 project.

B. CONTRACT DESCRIPTION.

1. CONTRACTS.
 - a. Contract C includes all work more particularly described in the Bid Form and as identified on the Plans, with additional description found within this Specification. Contract C generally includes the replacement of Lift Station 8 (LS8) including a new 8" forcemain and ancillary work associated with those connections and installations.
2. WORK BY OTHERS.
 - a. Any utility work that is within or outside of the project limits. Such work is not planned within this project, however, if such work occurs, the Contractor shall make every effort to accommodate utility work by others.
 - b. Work for Village of Kronenwetter 2025 Road Rehabilitation Projects (Contract AB, Contract D) is congruent with work on both contracts herein. A substantial portion of 8" forcemain under this Contract C will be run along the west shoulder on Kronenwetter Drive, where road rehabilitation work is planned. Although this work is not yet contracted, it is desired that forcemain work will be completed prior to road rehabilitation work under this contract. Hence a deliverable completion date is prescribed within this Contract C.
2. CONSTRUCTION LIMITS. Generally, the Construction Limits are the overall areas shown within the right-of-way of both contracts. The exception would be any staging areas designated by this contract or by the Village as a part of pre-construction coordination. All work should be completed within these limits. For this project, slope intercepts do not extend beyond the right-of-way and therefore are not anticipated in stationed work areas. There are minor transitional areas that are within each respective contract, limited to connecting points and facilitative transitioning areas around intersections. Connecting sections of existing driveways are considered to be within the project limits if necessary for general transitioning or restoration.
3. INCIDENTALS.
 - a. Restoration outside construction limits.
 - b. Underground utility locating or adjustments to address utility issues.
 - c. Unclassified excavation & removals not listed in the Bid Form.
 - d. Restoration due to construction staging or restoration beyond the scope of work unless mutually agreed upon in writing with the Owner.

C. PROJECT SPECIFICS.

1. SIGNAGE AND BARRICADES. Provide all signage and barricades necessary to complete the work. A traffic control plan shall be provided (see Shop Drawings). Maintenance of all such devices and methods shall be considered the responsibility of the Contractor.
2. REMOVALS. Clearing and grubbing is not anticipated. Any required salvageable removals such as valves, and manholes will need to be coordinated with the Village of Kronenwetter. Non-salvageable removal items such as concrete rubble, asphalt and boulders shall be disposed of in a suitable location off-site. Excess concrete disposal shall not be wasted onsite and shall be at no additional cost to the Owner. Topsoil will remain onsite in a designated controlled area.
3. DUST CONTROL. Where traffic is temporarily allowed on compacted base course in residential areas, provide dust control as necessary or as directed by the Owner.
4. NOISE CONTROL. The Work is not expected to be a nuisance in terms of noise, as long as traditional working hours are maintained. No additional controls are required.
5. SAFETY. The Contractor shall be solely and completely responsible for safety as set forth in the General Conditions. This requirement shall apply continuously and not be limited to normal working hours. Neither

the Owner nor the Engineer nor their representatives are responsible for safety. Maintain at the job-site safety equipment and apparatus applicable to the Work and as prescribed by governing codes and safety organizations.

6. PROTECTION OF SEWERS AND EXISTING MAINS. Sanitary sewer and water lines are in existence and located near the site(s), depicted as best as possible on the Plans. The Contractor shall make every effort to locate and protect these facilities, surface or subsurface, based on field verification wherever possible.
7. PROTECTION OF EXISTING SURFACE FEATURES. It is the Contractor's responsibility to protect existing work. Damage to existing work, as it may occur, shall be immediately reported and documented (given the possibility of other contractor's & equipment onsite).
8. SPILLS. Hazardous material spills, such as vehicle fluids, shall be immediately contained and reported to the Owner. Clean up shall be by qualified personnel/equipment. Depending on the estimated volume of the spill, the Contractor shall report the incident to the applicable authority.
9. ACCESS TO RESIDENCES. The cost of maintaining vehicle access to properties within the construction area is incidental to the work unless there is a specific bid item for maintaining access. The work includes grading as needed, providing crushed aggregate, and other measures necessary to keep the road or driveway passable. The Contractor shall work with Emergency Services and the Village to ensure vehicular access to properties, generally, is available at all times.
10. EXISTING CONDITIONS. The Contractor shall notify the Engineer in writing prior to the beginning of the work, or a distinct section of the work, if existing conditions are detrimental to the Contractor's work or that existing facilities or improvements are damaged. Some of these conditions include substandard base, broken or damaged driveways, damaged curb and gutter, storm pipes or damaged street signs. This also includes information not obtained in the field survey because it was not attainable. Failure to notify the Owner/Engineer shall place responsibility for the existing conditions and damaged items on the Contractor.
11. EXISTING UTILITIES. All of the existing underground utilities located within the project area may not be shown on the Drawings and underground utilities included on the Drawings may not be accurately located. The Contractor is responsible for contacting Digger's Hotline and local utility owners prior to construction to confirm the presence and location of public and private underground utilities. The Contractor is responsible for protecting overhead or underground utilities within the project area. The Contractor is responsible for field verifying the plan location of existing underground facilities that are within the construction limits that also may not necessarily be located by Digger's Hotline.
12. PHOTOGRAPHIC DOCUMENTATION. The Engineer will obtain pre-construction site photos on each private property or driveway that documents existing work conditions. The photos will be documented with the following information and provided at the pre-construction conference:
 - a. Name of project and contract.
 - b. Date photo was taken.
 - c. Digital metadata shall match the photo background information.
 - d. A project photo summary log shall be compiled and provided to the Owner and Engineer based on the above metadata and matching photo information.
13. CONTINUATION OF US POSTAL SERVICE. It shall be the responsibility of the Contractor to coordinate with the local postmaster as to the measures necessary to ensure mail delivery to all of the addressed within the affected construction area. This may include temporary mailboxes at locations specified by the post office. Rural mailboxes, removed to accommodate construction, shall be reinstalled upon completion of the work. Installation location and height shall be in accordance with the requirements of the US Postal Service. Coordinating and making provision for US Postal Service deliveries during the construction period shall be incidental to the construction unless specifically included in the Bid Form.
14. JOB MEETINGS. The Engineer will coordinate regular job meetings as the construction schedule is better define amongst the respective contracts. The following minimum job meetings are required:
 - a. Preconstruction Meeting
 - b. Regular Progress Meetings as Scheduled by Engineer
 - c. Testing Meetings
 - d. Meetings for Alterations If Needed

- e. Closeout, Walk-through or other Finalization Meetings
15. PRE-CONSTRUCTION MEETING. As described in Item #14, a pre-construction meeting is required. The minimum attendance shall be the Engineer, Owner, General Contractor and Major Subcontractors and Utilities. The minimum agenda shall be as follows:
- a. Submission of executed bonds and insurance certificates if not already distributed
 - b. Distribution of contract documents if not already distributed
 - c. Submittal of subcontractor list
 - d. Submittal of schedule of products, values, and schedule
 - e. Designation of project personnel
 - f. Chain of command and handling of communications
 - g. Procedures for processing requests for interpretations, information, field decisions, field orders, submittals, substitutions, pay applications, change orders, and contract closeout procedures.
 - h. Scheduling
 - i. Critical work sequencing.
 - j. Meeting records shall be kept by the Engineer and distributed to all project parties.
16. PROGRESS MEETINGS. The Engineer will make arrangements for progress meetings with key personnel as identified for regular and critical work, with the following minimum agenda (when required):
- a. Review minutes of previous meetings.
 - b. Review of Work progress.
 - c. Field observations, problems, and decisions.
 - d. Identification of problems impeding planned progress.
 - e. Review of submittal schedule and status of submittals.
 - f. Review of off-site fabrication and delivery schedules.
 - g. Maintenance of Progress Schedule.
 - h. Corrective measures to regain projected schedules.
 - i. Planned progress during the succeeding work period.
 - j. Coordination of projected progress.
 - k. Maintenance of quality and work standards.
 - l. Effect of proposed changes on Progress Schedule and coordination.
 - m. Other business relating to Work.
 - n. Engineer to record minutes and distribute to all project parties.
17. OTHER CONSTRUCTION PARTICULARS:
- a. Coordination, Generally. It is each General Contractor's responsibility to regularly communicate on scheduling and facilitative matters pertaining to the scope of work. This includes verification of utility work, notifications, verification of other construction projects in the scope of work, staging, testing, sampling, and other coordination that may be necessary.
 - b. Timing. Work on this Contract can occur with a Notice to Proceed (NTP).
 - c. Rock Excavation. Based solely on pavement cores/borings, bedrock is not present within the range of the project work. However, if encountered a bid item for rock excavation has been included in the Bid Form.
 - d. Trench Backfill. Trench backfill is covered in the specifications.
 - e. Alteration, Generally. Changes that are within the scope of work under this Contract can be processed by Change Order. Field decisions on base thickness, base stabilizers if proposed, roadway base geogrids, curb grade elevations, underground utility alignment, and restoration shall be made with the Owner and Engineer's approval.
 - f. Compaction Testing Required. Compaction testing is required to be provided by the Contractor, utilizing an independent 3rd party firm at the expense of the Contractor, to show compaction levels meeting the specification. This is required where deemed necessary by the Owner/Engineer in road or driveway areas.
 - g. The Owner will coordinate the following items:
 - 1. Public notices, if any

2. Assistance (contractor responsibility) with property owner notifications as necessary
 - h. A WDNR permit is not required on this project as there are no changes to flow.
 - i. The Contractor shall observe the basic objectives of construction site erosion control as included, at a minimum, on the plans.
 - j. Clean-up. The general contractor is responsible for clean-up and day-to-day administration of work within their construction contract limits.
18. WARRANTIES.
- a. The correction period of one year indicated in 13.07 of the General Conditions shall be changed to two (2) years for these Contracts unless otherwise covered by an equipment or operation specification.
19. PROTECTING INSTALLED CONSTRUCTION.
- a. Protect installed Work and provide special protection as needed for equipment and facilities interdependent between construction contracts.
 - b. Provide temporary and removable protection for installed products. Control activity in the immediate Work area to prevent damage.
20. QUALITY CONTROL.
- a. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
 - b. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 - c. Perform Work using persons qualified to produce required and specified quality.
 - d. Products, materials, and equipment may be subject to inspection by the Engineer and Owner at the place of manufacture or fabrication. Such inspections shall not relieve the Contractor of complying with the requirements of Contract Documents.
 - e. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
21. UTILITIES. The CONTRACTOR shall incorporate into his utility work and schedule the coordination of new utility services and relocation requirements, as necessary. The following Public Utilities have facilities located within the Village of Kronenwetter:

Electric	Wisconsin Public Service Corp.	2001 Plover Rd. Plover, WI 54467 (800) 450-7240
Gas:	ALLIANT Energy	722 Quartz Ave Matton, WI 54450 (800)255-4268
Telephone:	Wittenburg Wireless, LLC	104 W. Walker St. Wittenburg, WI 54499 (715) 253-2111
Water & Sewer	Village of Kronenwetter	1582 Kronenwetter Drive Kronenwetter, WI 54465 (715) 693-4200
Cable TV:	Frontier Communications	521 N. 4 th St Wausau, WI 54403 (715) 843-7265

D. PAYMENT PROCEDURES.

1. The Contractor shall supply pay requests in a suitable EJCDC format provided within the Contract Documents. If using a hard-copy format, provide three (3) copies.

2. Contractor shall note any materials provided by Village, and what they provided for on all payment applications.
3. The Contractor may submit a single copy of the pay request digitally, in a PDF format.
4. All payment requests are subject to final approval by the Engineer.
5. The payment period will be monthly. The Contractor shall allow for ample and reasonable time for Owner/Engineer approval (Typically 14 days). The Village of Kronenwetter meets regularly on or around the 1st Tuesday of the month.

-- END OF SECTION --

01 3323 SHOP DRAWINGS, PRODUCT DATA & SAMPLES

A. GENERAL

1.1 Section Includes

- A. Shop Drawings, Product Data, and Samples.

1.2 Preliminary Schedule of Shop Drawings Submissions

- A. Submit to the Engineer, within fifteen (15) days after the award of the contract, a preliminary schedule of Shop Drawings submissions.

1.3 Final Schedule of Shop Drawing Submissions

- A. Submit to the Engineer, at least fifteen (15) days prior to submitting the first Application for Progress Payment, final schedule of Shop Drawing submissions.

1.4 Shop Drawings

- A. Drawings shall be presented in clear and thorough manner.

- 1. Details shall be identified by reference to sheet and detail, or schedule shown on contract drawings.

- B. Construction documents shall not be reproduced for use as shop drawings.

- C. Prior to submittal, the Contractor shall review the shop drawings and make any corrections required. The Contractor shall stamp and sign the drawings that he has reviewed. The Contractor shall cloud or flag all items not in accordance with the contract documents and shall verify all dimensions.

- D. Any shop drawings received without the Contractor's signed review stamp, or other evidence that the Contractor has not thoroughly reviewed the drawings prior to submittal, shall immediately be returned without the Engineer's review.

- E. Any changes, substitutions or deviations from the original contract drawings shall be clouded by the manufacturer or fabricator. Any changes, substitutions, or deviations which are clouded or flagged by submitting parties shall not be considered approved after the Engineer's review, unless specifically noted by the Engineer.

- F. The approved shop drawings do not replace the original contract drawings. Items omitted or shown incorrectly are not to be considered changes to the original contract drawings. It is the Contractor's responsibility to ensure the items omitted or shown incorrectly are constructed in accordance with the contract drawings.

- G. Shop drawing review is only intended for general conformance to the design concept and construction documents.

- H. Shop drawings will be returned for resubmittal if major errors are found during review.

- I. Allow a minimum of (10) working days for review of shop drawings by the project engineer.

- J. Shop drawings shall be furnished for all structural components including, but not necessarily limited to:

1. **Generator System LS8**
2. **ATS**
3. **Electrical Panel, Junction Boxes, & Major Electrical Components**
4. **VFD Systems**
5. **Controls**
6. **Piping and Valves**
7. **Conduit**
8. **Concrete**
9. **Pumps & Appurtenances**
10. **Light Fixture, Pole & Base**
11. **Horizontal Directional Bore**
12. **Permitting**
13. **Above-Ground Valve Vault Systems**
14. **Air Release Components**
15. **Manholes or Delivered Concrete Structures**

1.5 Product Data

A. Preparation

1. Clearly mark each copy to identify pertinent products or models.
2. Show performance characteristics and capabilities.
3. Show dimensions and clearances required.
4. Show wiring or piping diagrams and controls.

B. Manufacturer's standard schematic drawings and diagrams.

1. Modify drawings and diagrams to delete information which is not applicable to the work.
2. Supplement standard information to provide information specifically applicable to work.

1.6 Samples

A. Office samples shall be of sufficient size and quantity to clearly illustrate.

1. Functional characteristics of the product, with integrally related parts and attachment devices.

1.7 Contractor Responsibilities

A. Review Shop Drawings, Product Data, and Samples prior to submission.

B. Determine and verify.

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance with specifications

C. Coordinate each submittal with requirements of work and of contract documents.

D. Notify the Engineer in writing, at time of submission, of any deviations in submittals from requirements of contract documents.

E. Do not begin fabrication on products which requires submittals until the return of submittals is made with Engineer approval.

1.8 Submission Requirements

A. Make submittals promptly in accordance with the approved schedule, and in such sequence as to cause no delay in the work or in the work of any other Contractor.

B. Submit to the Engineer for approval, in accordance with accepted schedule:

1. Six copies of all shop drawings, or
2. One reproducible copy, or
3. Copies as otherwise required by specifications

C. Submittals must contain:

1. The date of submission and dates of any previous submissions.
2. The project title and number.
3. Contract identification.
4. The names of the following:
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
5. Identification of the product, with the specification section number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of work or materials.
8. Applicable standards, such as ASTM or federal specification numbers.
9. Identification of deviations from contract documents.
10. Identification of revisions on re-submittals.
11. An 8" x 3" blank space for CONTRACTOR stamp.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements, field construction criteria, and coordination of information within submittal with requirements of work and of contract documents.

1.9 Re-submission Requirements

A. Make any corrections or changes in submittals required by the Engineer and re-submit until approved.

B. Shop Drawings and Product Data.

1. Revise initial drawings or data, and re-submit as specified for the initial submittal.
2. Indicate any changes which have been made other than those requested by the Engineer.

C. Samples: Submit new samples as required for initial submittal.

1.10 Approval of Shop Drawings and Samples

- A. The Engineer will review and approve within reasonable promptness shop drawings and samples, but the Engineer review and approval shall only be for conformance with the design concept of the project and for compliance with information given in contract documents.
- B. The Engineer's approval of shop drawings or samples shall not relieve the Contractor from his responsibility for any deviations from the requirements of the contract documents unless the Contractor has in writing called to the Engineer's attention to such deviation at the time of submission and the Engineer has given written approval to specific deviation, nor shall any approval by the Engineer relieve Contractor from responsibility for errors or omissions on the shop drawings.

1.11 Distribution

- A. The Engineer will distribute reproductions of shop drawings and copies of product data which carry the Engineer's stamp or approval to:
 1. Contractor - 1 copy
 2. Owner - 1 copy
 3. Engineer - 1 copy

B. PRODUCTS

Not Used

C. EXECUTION

Not Used

-END OF SECTION-

SECTION 03 8213

CONCRETE CORE DRILLING

PART 1. GENERAL

A. SUMMARY

1. This section outlines the requirements for performing core drilling operations in concrete structures associated with sewer manholes. The work is essential for facilitating the replacement of existing gravity sewer systems with new, larger sewer lines. It includes the provision for labor, materials, equipment, and the execution of core drilling to create access points or modify existing sewer manholes.

B. RELATED WORK

1. Section 33 31 10 – Manholes and Structures
2. Section 33 31 00 – Sanitary Sewer
3. Section 33 32 15 – Lift Station

C. REFERENCES

1. OSHA 29 CFR 1926

D. SUBMITTALS

1. Procedure Method Statement: Detailed methodology for core drilling, including equipment setup, drilling process, handling of core samples, and post-drilling repairs.
2. Environmental Protection Plan: Strategies for managing dust, debris, and wastewater generated during drilling operations, including containment and disposal methods.

PART 2. PRODUCTS

A. EQUIPMENT

1. Core drilling equipment shall be capable of drilling through reinforced concrete structures without causing structural damage. Equipment should accommodate wet drilling methods to control dust and facilitate clean cutting.

B. MATERIALS

1. Water or approved drilling lubricants for dust suppression and cooling of drill bits.
2. Non-shrink grout or appropriate patching materials for the restoration of drilling sites.

PART 3. EXECUTION

- A. SITE EXAMINATION
 - 1. Conduct a thorough examination of the drilling site to identify and mark underground utilities, existing sewer lines, and any other obstructions.
 - 2. Coordinate with local utility companies for clearances and permits as necessary.
- B. PREPARATION
 - 1. Erect temporary barriers and signage to ensure the safety of workers and the public.
 - 2. Implement environmental controls to prevent contamination of soil and water sources with drilling residues.
- C. CORE DRILLING OPERATIONS
 - 1. Perform core drilling at designated locations to create or enlarge openings in sewer manholes as per project specifications.
 - 2. Use wet drilling techniques to minimize dust and remove core material safely.
 - 3. Monitor structural integrity of the manhole and surrounding areas during drilling.
 - 4. Contractor to provide provisions to not allow any residue to proceed downstream.
- D. HANDLING AND DISPOSAL OF MATERIALS
 - 1. Dispose of drilling water, slurry, and other waste materials in accordance with environmental protection plans and local regulations.
 - 2. Handle and label core samples appropriately if required for analysis or quality control purposes.
- E. SITE RESTORATION AND CLEANUP
 - 1. After drilling, thoroughly clean the site, removing all debris and materials.
 - 2. Repair any damage to surrounding areas, using non-shrink grout or similar materials to restore drilled surfaces to their original condition or as specified in the contract documents.
- F. PROTECTION AND SAFETY
 - 1. Ensure all operations comply with OSHA standards for safety, particularly concerning work in confined spaces and hazardous environments.
 - 2. Maintain protective measures for drilled openings until subsequent construction activities are completed, preventing unauthorized access or contamination.

-END OF SECTION-

SECTION 05 1000

MISCELLANEOUS METALS

PART 1. GENERAL

A. SECTION INCLUDES

1. Provide lintels or supports to support various equipment, louvers, ducts, grills, etc.
2. Provide screws, nuts, bolts, washers expansion shields and bolts, inserts, shims and other accessories required for erection of the building, attachment of components.

PART 2. PRODUCTS

A. MATERIALS

1. Miscellaneous Structural Members
 - a. As shown on plans and as required to complete the work.
2. Miscellaneous Fasteners
 - a. Material and design as needed.
 - b. Devices for fastening aluminum shall be aluminum or stainless steel.
 - c. Provide high strength bolts meeting ASTM A325 for all primary connections. Use stainless steel in corrosive environment.
3. Steel Centering or Hold-Down: Heavy-duty galvanized
4. All ferrous metals under this section that are not galvanize or stainless shall be furnished with a prime coat touch-up after welding prior to finish painting. All paint for this purpose shall be brushed.

PART 3. EXECUTION

A. INSTALLATION

1. Install per manufacturer's guidelines and/or as per engineer's direction.

-END OF SECTION-

SECTION 09 9100

PAINTING

A. GENERAL

1. SECTION INCLUDES
 - a. Surface preparation and field application of paints and coatings.
2. REFERENCES
 - a. ASTM D16 – Definitions of Terms Relating to Paint, Varnish, Lacquer and Related.
 - b. ASTM D2016 – TEST METHOD FOR MOISTURE CONTENT OF WOOD.
3. SUBMITTALS
 - a. Product Data: Submit Manufacturer's data on each paint and coating product including:
 1. Product characteristics.
 2. Surface preparation instructions and recommendations.
 3. Primer requirements and finish specification.
 4. Storage and Handling requirements and recommendations.
 5. Application methods.
 6. Cautions.
 - b. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color sample available.
 - c. Verification Samples: For each finish product specified, submit samples that represent actual product, color and sheen.
4. QUALIFICATIONS
 - a. Manufacturer: Company specializing in manufacturing the Products specified in this section with a minimum of five years of experience.
 - b. Applicator: Company specializing in performing the work of this section with a minimum of three years of experience. At least one person shall be present at all time during execution of the work of this section, who is thoroughly familiar with the specified requirements and the materials and methods needed for the work.
5. REGULATORY REQUIREMENTS
 - a. Conform to applicable codes for flame and smoke rating requirements for finishes.
6. DELIVERY, STORAGE AND HANDLING
 - a. Except for custom-mixed colors, deliver products to site in sealed and labeled containers.
 - b. Container label to include manufacturer's name, type F paint, brand name, lot number, brand code, coverage, surface preparation, drying time, clean-up requirements, color designation and instructions for mixing and reducing.
 - c. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area and as required by manufacturer's instructions.
7. ENVIRONMENTAL REQUIREMENTS
 - a. Do not apply coating when surface and ambient temperatures are outside the ranges required by the product manufacturer.
 - b. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the product manufacturer.
 - c. Do not apply coating in areas where dust is being generated.
 - d. Provide lighting level of 80 ft-candles measured mid-height at substrate surface.
8. EXTRA MATERIAL

- a. Provide one gallon of each color or type.
- b. Label each container with color, type, texture and room locations, in addition to the manufacturer's label.

B. PRODUCTS

1. ACCEPTABLE MANUFACTURERS

- a. Manufacturer's and specific products are listed to establish the type and quality of coating to be provided. Products of other manufacturers are acceptable if equal in type and quality.

2. MATERIAL

- a. Metal Doors and Frames:
 - 1. Type: Acrylic
 - 2. Finish: Semi-Gloss
 - 3. 1st Coat: Factory-Primed
 - 4. 2nd Coat: Sherwin Williams, Sher-Cryl HPA; 3 mils DFT/coat.
 - 5. 3rd Coat: Sherwin Williams, Sher-Cryl HPA; 3 mils DFT/coat.
 - 6. Color: To be selected by Owner.
- b. Interior/Exterior Piping:
 - 1. Type: Acrylic
 - 2. Finish: Gloss
 - 3. 1st Coat: Sherwin Williams, Pro-Cryl Universal Primer; 3 mils DFT/coat.
 - 4. 2nd Coat: Sherwin Williams, Pro Industrial 0 VOC Acrylic; 3 mils DFT/coat.
 - 5. 3rd Coat: Sherwin Williams, Pro Industrial 0 VOC Acrylic; 3 mils DFT/coat.
 - 6. Color: Grey or match existing.
- c. Wet Well Piping:
 - 1. Type: Epoxy coal tar.
 - 2. Finish: Semi-Gloss
 - 3. 1st Coat: Tnemec Series 66 HB Epoxoline; 3.0 – 5.0 mils DFT.
 - 4. 2nd Coat: Tnemec 46H-413 HB Tnemec-Tar; 16.0 – 20.0 mils DFT.
 - 5. Color: Black

C. EXECUTION

1. EXAMINATION

- a. Verify surfaces are ready to receive work as instructed by the product manufacturer.
- b. Examine surfaces scheduled to be painted prior to commencement of the work. Report any condition that may potentially affect proper application.
- c. Do not proceed with surface preparation or application until conditions are suitable.
- d. Test shop applied to primers for compatibility with subsequent cover materials.

2. PREPARATION

- a. Remove electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing
- b. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
- c. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves and protective clothing. Quickly wash off any of the mixture

that come in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.

d. Definitions:

1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
2. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast-Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains or rust, stains of mill scale or stains of previously applied paint.
3. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast-Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains of rust, stains of mill scale or stains of previously applied paint.

e. Prepare surfaces in accordance with the coating manufacturer's recommendations and the following:

1. Shop Primed Steel Surface: Sand and scrape to remove loose primer and rust and solvent clean. Feather edges to make touch-up patched inconspicuous. Prime bare steel surfaces.
2. Steel and Ductile Iron Pipe: Solvent Cleaning followed by Commercial Blast Cleaning.
3. Submerged Steel and Ductile Iron Pipe: Solvent Cleaning followed by Near-White Blast Cleaning.

3. APPLICATION

- a. Apply all coatings and materials with manufacturer specifications in mind. Mix and thin coatings according to manufacturer recommendation.
- b. Do not apply to wet or damp surfaces.
- c. Apply coatings using methods recommended by manufacturer.
- d. Uniformly apply coatings without runs, drips or sags, without brush marks and with consistent sheen.
- e. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- f. Regardless of number of coats specified, apply as many coats as necessary for complete hid and uniform appearance.

4. CLEANING

- a. Reinstall electrical cover plates, hardware, fixture trim, fittings, etc. removed for painting.
- b. Collect waste materials which may constitute a fire hazard, place in closed metal container and remove daily from site.
- c. Touch up and restore damage finishes. Remove spilled, splattered or splashed paint.

-END OF SECTION-

SECTION 09 9110

CONCRETE SEWER COLLECTIONS MANHOLE AND WETWELL/LIFTSTATION CONCRETE REHABILITATION

1.0 - GENERAL

1.01 Scope:

- A. This specification covers the work necessary to furnish and install the chemical resistant system, complete, as shown on the drawings and as specified herein. Work includes, but is not limited to, the following:
1. Surface preparation, bug hole repair, honeycomb repair, crack and joint detailing, penetration detailing, and installation of the Medium Film system.
 2. Surface preparation and protective coating of miscellaneous exposed structural and mechanical metals as shown on the drawings.

1.02 Related Work Specified in Other Sections

- | | | |
|----|---------------|------------------------------------|
| A. | Section 03300 | Cast-in-Place Concrete |
| B. | Section 03251 | Expansion and Construction Joints |
| C. | Section 07194 | Under Slab Vapor Barrier |
| D. | Section 07200 | Exterior Below Grade Waterproofing |
| E. | Section 07900 | Joint Sealants |

1.03 Referenced Specifications Codes and Standards

- A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section. All references and standards listed shall be the latest revisions. Joint and individual documents are referenced.
1. SSPC – The Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4643
(412) 281-2331
 2. NACE – National Association of Corrosion Engineers
P.O. Box 218340
Houston, TX 77218-8340

- a. SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete
 - b. SSPC-TU 2/NACE 6G197 “Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment”
 - c. SSPC-SP 5/NACE No. 1, White Metal Blast Cleaning
 - d. SSPC-SP10/NACE No. 2, Near White Metal Blast Cleaning
 - e. SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning
 - f. NACE RP0892 “Linings over Concrete for Immersion Service”
 - g. NACE RP0188 “Discontinuity Holiday Testing of Protective Coatings”
 - h. NACE RP 6F-164 “Curing of Interior Tank Linings”
 - i. NACE RP 6F-166 “Recommended Practice for Inspection of Linings on Steel and Concrete”
3. ICRI – International Concrete Repair Institute
3166 S. River Rd., Suite 132
Des Plaines, IL 60018
(847) 827-0830
- a. Technical Guideline No.03372, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays”
 - b. Technical Guideline No. 03731, “Guide for Selecting Application Methods for the Repair of Concrete Surfaces”
 - c. Technical Guideline No. 03741/SSPC-TR 5/NACE Pub 02203, “Design, Installation, and Maintenance of Protective Polymer Flooring Systems for Concrete”
4. ASTM – American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
(610) 832-9585
- a. ASTM F1869 “Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”
 - b. ASTM E-337: Test Method for Measuring Humidity with a Psychrometer
 - c. ASTM D 4258 “Practice for Surface Cleaning Concrete for Coating”
 - d. ASTM D 4261 “Practice for Surface Cleaning Unit Masonry for Coating”
 - e. ASTM D 4262 “Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces”
 - f. ASTM D 4414 “Standard Practice for Measurement of Wet Film Thickness by Notch Gages”
 - g. ASTM Committee D01.23: Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gauge
 - h. ASTM D 4541 “Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers”
 - i. ASTM D 4787 “Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates”

- j. ASTM D 5162 “Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates”
- 5. ACI – American Concrete Institute
Box 19150, Redford Station
Detroit, Michigan 48219
(248) 848-3700
 - a. ACI 344R-T “Design and Construction of Circular Pre-stressed Concrete Structures with Circumferential Tendons”
 - b. ACI 344R-W “Design and Construction of Circular Wire and Strand Wrapped Pre-stressed Concrete Structures”
 - c. ACI 350-01 “Code Requirements for Environmental Engineering Concrete Structures”
 - d. ACI 350.1 “Testing of Reinforced Concrete Structures for Water Tightness”
 - e. ACI 350.2 “Concrete Structures for Containment of Hazardous Material”
 - f. ACI 503 “Use of Epoxy Compounds with Concrete”
 - g. ACI 504 “Guide to Sealing Joints in Concrete Structures”

1.04 Submittals:

- A. Submit product data for each component specified including data substantiating that the proposed materials comply with specified requirements, and recommendations by the manufacturer covering all materials.
- B. Samples of the cured system as described in Part 3.03.D to include the following
 - 1. Finish texture as determined by the owner or owners’ authorized representative.
 - 2. Stepped samples showing stages of multi-layer applications.

1.05 Quality Assurance

- A. Acceptable Manufacturers: A company with a minimum of 5 years experience in manufacturing of, and providing technical service for chemical resistant systems equivalent to those specified herein.
- B. Single Source Supply: All products described in Part 2.01 shall be manufactured by or approved for use by the manufacturer of the chemical resistant system specified herein.
- C. Installer Qualifications: A firm experienced in the application of chemical resistant systems in sewer collection applications, or a facility owner’s approved maintenance organization.
- D. Pre-Installation Conference
 - 1. The contractor, the installation sub-contractor, and the chemical resistant system manufacturer’s representative shall meet on site with the owner’s representative. Particular emphasis shall be placed on

these specifications, safety, weather conditions, surface preparation, material application, and inspection.

2. The contractor shall submit to the owner's representative any revisions or changes agreed upon, reasons thereof, and parties agreeing or disagreeing with them.
- E. Substrate Conditions: Do not proceed with work until substrate preparation and tolerances have been approved by the owner's representative, chemical resistant system manufacturer's representative, the approved installation sub-contractor, and the contractor.

1.06 Delivery, Storage, and Handling

- A. Deliver products to the job site in manufacturer's original, unopened containers bearing manufacturer's name and label and the following information
1. Product name
 2. Product description (generic product classification)
 3. Manufacturer's lot number
 4. Color
- B. Store materials in sealed original manufacturer's containers. Store materials in a protected area out of direct sunlight. Keep containers clean and undamaged. Adhere to manufacturer's published storage temperature and shelf life recommendations. Protect all materials from freezing.

2.00 PRODUCTS

2.01 Acceptable Manufacturers and Materials

- A. The Medium Film Coating System shall consist of one or more systems for concrete repair and corrosion protection. Products are specified as a standard of quality, and are manufactured by The Sherwin-Williams Company, Cleveland, Ohio.
1. Concrete repair of bug holes and honeycombs – Designated areas to be treated shall receive application of Sherwin-Williams Duraplate 2300 patching and resurfacing compound or AW Cook MSM repair mortar. Thickness shall be sufficient to fill voids and restore the surface to required original surface plane. The selection of cementitious or epoxy mortar shall be at the discretion of the contractor to meet the desired requirements of workability and cure time.
 2. Concrete Crack and Joint Details – Exposed cracks, construction joints, contraction joints, and isolation joints shall be prepared and detailed in accordance with the attached detail drawings. Should any conditions or joint design be discovered that is not detailed in the attached drawings, the contractor shall notify the owner and consult with the material manufacturer for recommendations.
 3. Miscellaneous steel surfaces to be treated shall receive application of Sherwin-Williams' Duraplate 6000 Medium Film Coating/Lining System.

4. Concrete surfaces to be treated shall receive application of Sherwin-Williams' Duraplate 6000 Medium Film Coating/Lining System.

2.02 Performance Criteria

- A. The chemical resistant system shall be resistant to the chemical concentrations, temperatures, and duration of exposure, as submitted by the owner or authorized owners' representative.
- B. Physical Properties
 1. Adhesion, ASTM D-454: Concrete 350 psi. 100% concrete failure
 2. Abrasion Resistance, ASTM D-4060 (CS 17): 70 mg. wt. Loss
 3. Flammability, ASTM D-635: Self-extinguishing over concrete
 4. Shore D Hardness, ASTM D-2240: 90
 5. Water Vapor Transmission, ASTM E-96: 0.0016 perm in.

3.0 EXECUTION

3.01.1 Surface Preparation

- A. Concrete
 1. The NACE/SSPC Joint Surface Preparation Standards for concrete surface preparation are incorporated in and made part of this specification. All references to SSPC SP-13/NACE No 6 designate the definitions and other requirements in these documents. The International Concrete Repair Institute (ICRI) Technical Guideline #03732, Guide to Surface Preparation of Concrete to Receive Sealers, Coatings and Polymer Overlays shall be used to visually evaluate the concrete surface profile. Refer to Sherwin-Williams' Concrete Surface Preparation Guide.
 2. Inspect concrete surface for soundness, flatness, levelness and overall condition. Report any discrepancies to the owner's representative.
 3. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile CSP-3 to CSP-5
 4. Following surface preparation, concrete surfaces shall be tested for moisture vapor emissions in accordance with ASTM F1869, Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride Moisture Emissions Test. Report results to owner's representative and Sherwin-Williams' Industrial & Marine Representative.
 5. Concrete Surface Repair: Bug holes and honeycombs
 - a. Areas less than 1/2" deep shall be repaired with Duraplate 2300 patching and resurfacing compound.
 - b. Areas that are greater than 1/2" deep shall be repaired with AW Cook MSM repair mortar.

6. Provide a clean, saturated surface dry (SSD) concrete surface with no free standing or moving water, with a minimum surface profile as defined above. All substrates are to be vacuumed, swept and blown down with clean, dry air to remove spent abrasive, dust and other foreign material that might interfere with the adhesion of the primer and lining.

B. Miscellaneous Metals

1. The NACE / SSPC Joint Surface Preparation Standards for abrasive blasting approved in October 1994 are incorporated in and made a part of this specification. All references to SSPC-SP7 / NACE No. 3 and SSPC-SP10 / NACE No. 2 designate the definitions and other requirements in these documents. SSPC VIS 1-89 Visual Standard for Abrasive Blast Cleaned steel shall be used to visually evaluate the blast cleanliness.
2. Remove all oil and grease from surface by solvent cleaning per SSPC-SP1. Minimum surface preparation is SSPC-SP10 / NACE No. 2, Near White Metal Blast Cleaning. Abrasive blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils). Prime any bare steel the same day as it is cleaned and before flash rusting occurs. Refer to Sherwin-Williams Guidelines Procedures for Surface Preparation of Metals.
 - a. Inspect the surfaces to be coated. All holes in the steel surfaces or pits greater than 1/8 inch shall be repaired in accordance with the owner's repair procedures.
 - b. Remove or grind down all sharp burrs, edges, and weld spatter from all steel that is to be coated. Corners and edges shall be chamfered 1/16" at a 45° angle minimum or rounded to a 1/16" radius (1/8" diameter) minimum. Abrasive blasting prior to the application of the coating materials shall restore the anchor profile.
 - c. All substrates are to be vacuumed, swept and blown down with clean, dry air to remove spent abrasive, dust and other foreign material that might interfere with the adhesion of the primer or basecoat.
 - d. The maximum allowable residual salt contamination, as measured with a KTA Scat Kit or equivalent field test method, immediately prior to the application of the first coat is as follows:
 - 5 micrograms per square centimeter (50mg/m²) most commodities up to 120°F
 - 2 micrograms per square centimeter (20mg/m²) most commodities at 120°F and greater
 - 2 micrograms per square centimeter (20mg/m²) for demineralized (deionized, distilled) water
 - e. Corrosion pits in the blasted steel shall be filled flush with the substrate with Steel-Seam FT 910 patching and resurfacing compound.

- f. Projections and lap joints on welded plates and on riveted plates to be coated shall be filled with Steel-Seam FT 910 patching and resurfacing compound in order to smooth out the surface and provide for a smooth transition of the coating over the substrate.

3.02 Application

- A. Comply with manufacturers written installation procedures and individual product data sheet application bulletins.
- B. Apply materials in accordance with the following material coverage:

Duraplate 6000 Epoxy Medium Film Coating/Lining System

<u>Products</u>	<u>Thickness (mils dft)</u>
<i>Repair/Patching and resurfacing Compound</i> Duraplate 2300 or AW Cook MSM	As needed
Primer Duraplate 235	Applied at 400-500 sqft/gal
<i>First Coat</i> Duraplate 6000	80-120
Total Targeted Thickness:	80-120

3.03. Inspection and Testing

- A. The owner or owner's authorized representative may require the services of an independent testing laboratory to test the installed system. It shall be the awarded contractors responsibility to conduct high voltage holiday detection per ASTM D4787 upon completion of installation. All deficiencies shall be repaired immediately prior to owner acceptance.
- B. If test results indicate noncompliance with the specification, the following corrective action may be required of the Contractor:
 1. Remove non-compliant systems or components.
 2. Replace system or components in (1)
 3. Assume the testing expenses.
- C. Minimum requirements of the chemical resistant system are that it be free of the following:
 1. Uncured material
 2. Inadequate thickness
 3. Pinholes
 4. Blisters
 5. Delamination
 6. Foreign matter

7. Unspecified materials

3.04. Protection

- A. Chemical resistant system shall be protected from damage or detrimental elements during cure and until the time of final acceptance.

--END OF SECTION--

SECTION 22 1000

PLUMBING PIPING

A. GENERAL

1. SECTION INCLUDES
 - a. Drain, waste and vent piping.
 - b. Water Distribution Piping.
 - c. Plumbing specialties.
2. REFERENCES
 - a. ASME B16.22 – Wrought Copper and Bronze Solder-joint Pressure Fittings.
 - b. ASTM B88 – Seamless Copper Water Tube.
 - c. ASTM D2665 – Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
3. RELATED SECTIONS
 - a. See 43.30.10 Integral Chemical Storage & Supply for chemical piping.
4. SUBMITTALS
 - a. Product Data: Provide data on ALL pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
5. PROJECT RECORD DOCUMENTS
 - a. Provide as built measurements and location on a clean copy of the construction drawings of all plumbing lines including locations of valves and other equipment and appurtenances.
6. QUALITY ASSURANCE
 - a. Products listed on the Drawings and in the specifications by manufacturer describe the minimum quality requirements.
 - b. All materials and equipment shall be new and the standard products of manufacturers regularly engaged in the supply of plumbing materials and equipment.
7. REGULATORY REQUIREMENTS
 - a. Perform work and supply materials in accordance with SPS 382 and related Appendices.
 - b. Meet applicable local codes. Obtain and pay for any required local permits.

B. PRODUCTS

1. UNDERGROUND DRAIN AND VENT PIPE
 - a. Polyvinyl Chloride (PVC), schedule 40 DWV (ASTM D-2665) with glue joints.
2. ABOVE GROUND DRAIN AND VENT PIPE
 - a. Polyvinyl Chloride (PVC), schedule 40 DWV (ASTM D-2665) with glue joints.
3. WATER DISTRIBUTION PIPE BELOW GROUND
 - a. Seamless copper tube, Type K, soft temper (ASTM B-88) with wrought solder joint pressure fittings (ANSI B16.22).
4. WATER DISTRIBUTION PIPE ABOVE GROUND
 - a. Rigid Pipe. Seamless copper tube, Type L, hard temper (ASTM B-88) with wrought solder joint pressure fittings (ANSI B16.22). CPVC Schedule 80, solvent cement joints, may be substituted.
 - b. Flexible Pipe for In-floor heating application. PEX-B
5. FLOOR DRAINS
 - a. Cast iron with round, adjustable nickel-bronze strainer; See Schedule on Plans.
6. VALVES
 - a. Two-piece bronze body ball valve, full port, rated for 150 PSI WOG.
7. WALL FAUCETS
 - a. Interior: Wall faucet with vacuum breaker-backflow preventer and ¾ inch hose thread nozzle meeting ASSE Std 1019-B. See Schedule on Plans.
 - b. Exterior: Automatic draining, freezeless wall faucet with vacuum breaker-backflow preventer and ¾ inch hose thread nozzle meeting ASSE Std 1019-B. See Schedule on Plans.

8. FLASHING
 - a. Lead: 5 lb./sq. ft. sheet lead.
 - b. Metal Flashing: 26-gauge galvanized steel.
 - c. Metal Counterflashing: 22-gauge galvanized steel.
 - d. Flexible Flashing: 47 mil sheet butyl.
9. REDUCED PRESSURE ZONE BACKFLOW PREVENTER
 - a. Watts 009M2-QT Reduced Pressure Zone Assembly or approved equal, 2" with NPT end connections. If Required.
10. CHEMICAL PIPING
 - a. All connections and fittings to pumps, valves and meters shall be of non-corrosive materials, submitted for shop drawing review.
 - b. Neoprene & Polyurethane flexible tubing appropriate for chemical installations and peristaltic pump configuration to a sealed poly tank.
11. EYEWASH AND SHOWER STATION
 - a. Water distribution line size servicing any onsite eyewash and shower station will be specified by the manufacturer.

C. EXECUTION

12. SANITARY DRAINING PIPING
 - a. PVC DWV pipe and fittings shall be installed as recommended by manufacturer, State Code and ASTM D-2665.
 - b. Route piping in orderly manner and maintain gradient.
 - c. Changes in direction of drainage piping shall be made with "Y's", bends or elbows of long radius pattern. Fittings shall be installed to make for at least a possibility of stoppage.
 - d. Provide traps at all fixtures, unless provided as an integral component of the fixture.
 - e. Install bell and spigot pipe with bell end upstream.
13. WATER DISTRIBUTION PIPING
 - a. Install all water supply and distribution piping per SPS 382, including valves and accessories as required.
 - b. Upon completion of the water distribution system, test all valves to insure their full opening and flush out the system progressively by opening building outlets and permitting the flow to continue from each until the water runs clear.
 - c. At completion of all piping, fill system with sanitizing solution per SPS 382 and let circulate for a minimum of 24 hours. Rinse thoroughly after sanitizing solution with clean water. Certify system has been cleaned and submit certificate to Owner. Obtain water test for coliform bacteria from an independent testing laboratory and submit test report to Owner.
14. FLASHING
 - a. Provide flexible flashing and metal counterflashing where piping penetrates roof.
15. SAFETY
 - a. Chemical piping shall be installed in accordance with the requirements of NR 110.22, and shall include appropriate safety provisions for exposed pipe in work areas.

--END OF SECTION--

SECTION 23 1123

FACILITY NATURAL GAS PIPING

PART 1 - GENERAL

1.1 SCOPE

- A. Work under this Section shall include furnishing, installing and testing the complete gas piping distribution system including pipe, fittings, valves, together with all permanent components attached.
- B. Conform to State and local codes.
- C. Conform to NFPA #54, National Fuel Gas Code.
- D. Conform to NFPA #101, Life Safety Code.
- E. Conform to local gas utility regulations.

1.2 SHOP DRAWINGS

- A. Required for pressure regulators and special fittings.

PART 2 - PRODUCTS

2.1 PIPING ABOVE FLOOR INSIDE BUILDING

- A. Schedule 40 black steel pipe, ASTM A-53, with 150 psi steel weld fittings or 150 psi malleable iron screw fittings.

2.2 PIPING BELOW GROUND OUTSIDE BUILDING

- A. EAGLE TUFF "Tri-Strip", non-metallic tubing, with matching fittings and accessories.
 - 1. (Equals by prior approval only).

2.3 GAS REGULATORS

- A. Gas services to building will be provided at 2 Psig. System regulators shall be provided and installed by Mechanical Contractor.
- B. Equipment regulators shall be provided with all mechanical equipment.

PART 3 - EXECUTION

3.1 GAS SERVICE TO BUILDING

- A. The Mechanical Contractor shall request a new gas service on behalf of the Owner, coordinate all such work, and pay any application fees.
- B. If the gas service is used for temporary heat, this Contractor shall pay all meter charges and connection charges as required. Gas costs will be billed to the Contractor. Charges for change in billing address will be assumed by this Contractor.

3.2 NATURAL GAS PIPING DISTRIBUTION SYSTEM

- A. All gas piping 2-1/2 inch and larger shall be welded. Piping 2-inch and smaller may be screwed “downstream” of the pressure regulators.
- B. Seamless welding fittings shall be used for all welded piping, except that welding nipples (Weldolets, Thredolets or Pipe-o-Lets, 250# minimum w.p.) may be used for branch take-offs up to one-half (1/2) the diameter of the main.
- C. No pipe bends will be allowed (except for exterior and/or direct-buried piping). Gas piping shall grade 1/4 inch in 15 feet to drip pots at all low points. All changes in pipe size shall take place at branches. Take-offs to be at top or side of main.
- D. Gas piping shall be installed with swing joints or other positive means of expansion to relieve the thrust on the pipe at the point where it pierces the building wall. The annular space between the pipe and sleeve, where the pipe pierces building walls, shall be caulked or sealed watertight.
- E. No interior gas piping shall be concealed unless the space is ventilated or a continuous ventilated steel sleeve is provided.
- F. Provide continuous steel sleeves where gas piping passes over exit corridors.
- G. Open ends of gas piping shall be capped until extension or connection to equipment can be completed.
- H. Insulating (dielectric) union shall be provided in the above-ground gas piping at each gas service entrance, on the service-side of the gas meter. Coordinate with local utility.
- I. See Section 23 05 53 for painting of gas piping. All gas piping shall be painted by this Contractor.

3.3 SETTING VALVES AND STOPS

- A. Before setting, clean the interior of valves and stops. Refer to Section 23 05 23 of this Division.

3.4 SYSTEM REGULATORS

- A. Install gas pressure regulators where shown on Drawings, in acceptable location, as directed by manufacturer.
- B. Provide and install a gas service isolation valve immediately upstream from all gas pressure regulators. The isolation valve may be same size as the regulator connections if the valve is full port and is installed close to regulator with a pipe nipple.
- C. Provide and install a gas pressure gauge and gauge isolation valve immediately downstream from all gas pressure regulators. Install so that gauge is easily read from the ground.
- D. Vents from regulators shall be piped to exterior of building and terminated with screened elbow turned down to shed rainwater. Contractor is responsible for routing of this vent piping – subject to Engineer approval.

3.5 TESTING

- A. All gas piping shall be tested per Section 23 05 92. Use compressed air, nitrogen or carbon dioxide for testing.

3.6 PURGING LINES

- A. Purge with gas to remove all air from the distribution system, which will be ready for service at the time of acceptance of the work.

3.7 EQUIPMENT CONNECTIONS

- A. Provide shut-off cock, dirt leg and union at each equipment connection. Install regulator furnished for equipment, as required.
- B. Verify inlet pressures to equipment and regulators to be connected. Replace equipment regulators or install additional regulators as required.

--END OF SECTION--

26 6010

GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

A. RELATED REQUIREMENTS

1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.

B. DEFINITIONS

1. The Owner: Village of Kronenwetter, WI
2. The Engineer: Roth Professional Solutions, Portage, Wisconsin.
3. Provide: Furnish, install and wire complete and ready for service.
4. Exposed: Exposed to view in any room, corridor or stairway.
5. Code: National, State and Local Electrical codes including OSHA requirements.
6. NEC: National Electrical Code
7. Signal Voltage: NEC class 1, 2, or 3 remote control, signaling, or power limited circuits.
8. Low Voltage: 50 to 600 volts
9. Medium Voltage: 601 to 35,000 volts
10. High Voltage: 35,001 volts and greater

C. STANDARDS AND CODES

1. All work shall be installed in accordance with National, State, and Local codes, ordinances, laws, and regulations. National Codes include, but are not limited to, the NEC and NFPA 820. Comply with all applicable OSHA regulations.
2. All materials shall have a UL or ETL label where a UL or ETL Standard and/or test exists.

D. DIMENSIONS AND DEFINITE LOCATIONS

1. The drawings depicting electric work are diagrammatic and show, in their approximate location, symbols representing electrical equipment and devices. The exact location of such equipment and devices shall be established in the field in accordance with instructions from the Engineer and/or as established by manufacturer's installation drawings and details.
2. The Contractor shall refer to shop drawings and submittal drawings for all equipment requiring electrical connections to verify rough-in and connection locations.
3. Unless specifically stated to the contrary, no measurement of an electric drawing derived by scaling shall be used as a dimension to work by. Dimensions noted on the electric drawings are subject to measurements of adjacent and previously completed work. All measurements shall be performed prior to the actual installation of equipment.

E. DRAWINGS

1. The Contractor shall keep a detailed up-to-date record, of the manner and location in which all installations are actually made, indexing each feeder, pull box and protective device.
2. As Built Drawings - See General Requirements - Division 1.
3. In the event of a conflict between the drawings and specifications, Contractor shall base their bid on the greater quantity, cost or quality of the item in question, unless such conflict is resolved by an addendum.

F. SHOP DRAWINGS AND EQUIPMENT BROCHURES

1. Submit to Engineer for review, the manufacturer's shop drawings and/or equipment brochures in accordance with the following specifications:
 - a. Section 26.60.11 – Electrical Studies (Not required)
 - b. Section 26.61.11 – Conduits
 - c. Section 26.61.12 – Conduit Fittings
 - d. Section 26.61.20 – Low Voltage Wires, Cables and Connectors
 - e. Section 26.61.30 – Electrical Boxes
 - f. Section 26.61.40 – Wiring Devices
 - g. Section 26.61.70 – Motor and Circuit Disconnects (Include disconnect overcurrent devices with this submittal)
 - h. Section 26.64.02 – Underground Electric Service
 - i. Section 26.64.21 – Surge Protective Devices
 - j. Section 26.64.50 – Grounding (including Ground rod locations and measured resistance)
 - k. Section 26.64.61 – Low Voltage Dry Type Transformers
 - l. Section 26.64.70 – Electrical Panelboards (Include panelboard overcurrent devices with this submittal)
 - m. Section 26.64.75 – Low Voltage Overcurrent Protective Devices
 - n. Section 26.64.81 – Motor Starters
 - o. Section 26.64.83 – Adjustable Frequency Controllers
 - p. Section 26.65.01 – Lamps
 - q. Section 26.65.10 – Lighting Fixtures
 - r. Section 26.66.20 – Standby Power Generator
 - s. Section 26.66.21 – Automatic Transfer Equipment
 - t. Section 26.69.60 – Testing Electrical System
2. Plans - Lighting Control Contactors, Lighting Control Time Clocks, Lighting Control Photocells
3. Shop drawings shall be submitted in advance of construction and installation so as to not cause delay in other Contractor's work.
4. If a specification referenced herein is not included in the Project Documents, a submittal shall be made with the Engineer using products/components in compliance with all state and local codes.

G. TESTS AND ACCEPTANCE

1. The operation of the equipment and electrical systems does not constitute an acceptance of the work by the Owner. The final acceptance is to be made after the Contractor has adjusted his equipment and demonstrated that it fulfills the requirements of the drawings and the specifications.
2. After the work is completed and prior to acceptance, the Contractor shall conduct the following tests, tabulate data, date, sign and submit to the Engineer:
 - a. Standard megger insulation test on each feeder.
 - b. Ground resistance test.
 - c. Clamp ammeter test on each feeder conductor with all utilization equipment energized. The load current in each phase conductor of the feeder or the portion thereof supplying the panel shall not differ from the average connected load currents in the feeder conductors by more than 7½%. If the load current does differ by more than 7½%, the Contractor shall change phase loading to same or receive written approval from the Engineer that this is not required due to the nature of the load.
3. Upon completion of the installation, the Contractor shall furnish certificates of approval

from all authorities having jurisdiction. The Contractor shall demonstrate that all work is complete and in perfect operating condition, with race way and conduit system properly grounded, all wiring free from grounds, shorts, and that the entire installation is free from any physical defects.

4. In the presence of the Engineer and the Owner, the Contractor shall demonstrate the proper operation of all miscellaneous systems.
5. Perform other tests as specifically directed in other sections of the specification for specific equipment.

H. IDENTIFICATION

1. Each distribution and lighting panel shall be equipped with a typewritten directory describing the loads served. Directory shall be contained in a steel frame mounted on the inside face of the panel's door and shall be covered with a sheet of clear plastic.
2. All distribution panels, transformers, telephone backboards, transfer switches, panels and cabinets shall be provided with 1/8" minimum thickness 5 ply lamecoid plastic nameplates indicating usage, plan designation and voltage where applicable. Nameplates shall be white with black engraved lettering. Lettering shall be 1/2" high minimum. Fasten nameplates with escutcheon pins.
3. All panelboards and control panels shall include a warning label indicating the risk of Arc Flash. The warning label shall comply with N.E.C. article 110.16 and O.S.H.A. 29.
4. Junction and pull boxes shall be stenciled as follows:
 - a. Lighting and power feeders and branch circuits - 120, 208, 240, 277, and 480V.
 - b. Voice/Data communications - V/D COM
 - c. Instrumentation & Control - I&C
5. Branch wiring shall be color coded per industry standards. Where wires of different systems junction in a common box each cable shall be grouped with its own system and identified using tags or identification strips.
6. On all 3 phase systems, each phase shall be identified at all terminals using code marker.
7. All cover plates for control stations controlling remote equipment shall be engraved to identify the device being controlled.
8. All motor starters, remote control stations, etc., shall be identified with engraved lamecoid nameplates fastened to the equipment with escutcheon pins. Nameplates shall be 1/8" 5 ply lamecoid with 1/2" black letters on a white background. Adhesive cloth labels, similar to those manufactured by Brady Label Co., may be used on motor switches and controls only, indicating the number, designation, size and usage of the motor.
9. Refer to individual specification sections for more specific or additional identification requirements.

I. ACCESS PANELS

1. All access panels required by code or otherwise to electrical service equipment shall be supplied and installed by the Contractor.

J. CORROSIVE AREAS

1. Refer to drawings for areas that are designated corrosive.

K. FIRESTOPPING

1. Openings in fire rated construction and annular spaces around conduits, cable trays, and other penetrating items shall be protected in accordance with NEC article 300-21 and in accordance with the Wisconsin Administrative Code, Department of Safety and Professional Services Chapter 51.049. The fire rating of the protective seal shall be at least that of the floor or wall into which it is installed, so that the original fire rating of the

- construction is maintained.
2. Firestopping materials shall include, but not be limited to, mortars, sealants and caulks, putties, collars, intumescent wrap strips mastics, and firestop pillows. All materials and methods used shall be recognized by an independent testing agency and shall have flame and temperature ratings assigned by that agency.
 3. Materials using solvents or those requiring hazardous waste disposal shall not be used.
 4. All wall or floor penetrations openings shall be as small as possible.
 5. All openings and annular spaces required by code to be protected, shall be protected whether specifically indicated on the plans or not.
 6. The firestop assemblies shall meet ASTM E-814 and all of the fire test and hose stream test requirements of an independent testing agency.
 7. Installation of materials and assemblies shall be in strict accordance with the manufacturer's instructions.
 8. Acceptable Manufacturers
 - a. 3M Corporation.
 - b. Nelson Firestop Products
 - c. Rectorseal Corporation

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--END OF SECTION--

SECTION 26 6111

CONDUITS

PART 1. GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide conduit systems for all power, control, and communications systems wiring as specified. Flexible, modular wiring systems shall not be used unless expressly accepted by the Engineer.
- C. QUALITY ASSURANCE
 - 1. National Electrical Contractors Association (NECA) Standard of Installation.
 - 2. National Electrical Code (NEC) Including State of Wisconsin and local supplements.

PART 2. PRODUCTS

- A. GALVANIZED RIGID CONDUIT (GRC)
 - 1. Manufactured lengths, full weight, heavy wall, rigid steel conduit, protected inside and out by hot-dipped galvanized or electro-galvanized coating.
 - 2. Minimum conduit size shall be 3/4 inch.
- B. POLYVINYL CHLORIDE CONDUIT (PVC)
 - 1. Standard lengths and sizes.
 - 2. Minimum size 3/4" with the exception that the minimum size conduit for underground site lighting circuits shall be 1".
 - 3. Schedule 40 or 80, heavy wall rigid plastic (PVC) conduit manufactured to NEMA TC-2 standards, UL listed, and as required by NEC. Sunlight resistant.
 - 4. Rated for 90 degrees C. cable.
- C. PVC COATED RIGID METAL CONDUIT
 - 1. Per NEMA Standards Publication No. RN 1 - 1980 and ANSI C80.1. Shall be ETL Verified PVC-001.
 - 2. Rigid steel galvanized conduit with PVC coating.
 - 3. Full weight 40 mil thick PVC coating, bonding to galvanized metal shall be stronger than plastic tensile strength.
 - 4. Minimum conduit diameter shall be 3/4 inch.
- D. LIQUIDTIGHT FLEXIBLE METAL CONDUIT
 - 1. Galvanized spiral strip flexible steel.
 - 2. Standard conduit sizes.
 - 3. Heavy wall sunlight resistant PVC jacket.

4. **Minimum** size 3/4 inch.

PART 3. EXECUTION

A. GENERAL

1. Interior conduits for wiring systems rated 50 to 600 volts shall be galvanized rigid conduit (GRC). Exceptions to the requirements stated above are as follows:
 - a. Conduits for feeder conductors shall be GRC regardless of conduit size.
 - b. Conduits in poured concrete construction shall be GRC regardless of size.
 - c. Flexible conduit where required by other paragraphs in this section.
 - d. Conduits in hazardous locations.
 - e. Conduits in corrosive areas.
2. Exterior underground conduit in direct contact with the earth and conduits embedded in concrete lighting fixture pole bases shall be heavy wall schedule 40 PVC except as follows:
 - a. Underground conduit runs which enter or exit the building envelope shall utilize PVC-coated rigid metal conduit from the point of penetration of the building envelope and the next 5' portion of the run in direct contact with the earth.
 - b. Underground conduit runs which contain adjustable frequency drive conductors shall be PVC-coated rigid metal.
3. Exterior exposed conduit (i.e. outside of building wall or above roof) shall be GRC.
4. Conduits encased in concrete as part of an underground electrical duct package shall be schedule 40 HW PVC except that conduits within 5' of a manhole or within 5' of the building envelope shall be PVC-coated rigid metal.
5. Conduits installed in corrosive areas shall be PVC coated rigid metal conduit. Corrosive areas are identified on the drawings.
6. Conduits containing only electrical service bare copper grounding conductors shall be HW PVC.

B. DIRECT BURIED UNDERGROUND CONDUIT

1. Exterior underground direct buried conduits shall be buried at a depth of not less than 30 inches below grade.
2. Provide conduits or ducts terminating below grade with means to prevent entry of dirt or moisture.
3. Underground conduits shall slope 1/8" per foot for proper drainage. Conduits shall drain toward manholes and junction boxes, not the electrical equipment.

C. PROCEDURES AND PRACTICES

1. All conduit shall be routed concealed in finished spaces and shall not be visible at any point within the finished space or from the building's exterior. This requirement also applies to new conduits installed in existing construction. Exposed raceway may be used on remodeling projects only where physically impossible to route concealed in existing construction. In each case the specific raceway type and routing shall be submitted to the Engineer for approval. Where allowed, the general installation requirements are as follows.
 - a. Raceways shall be routed horizontally along the corners of walls and ceilings,

- directly above edges of base molding at floors, or along the tops of window and door frames.
- b. Raceways shall be routed vertically along corners of adjacent walls and along the edges of window and door frames.
 - c. Raceways shall not be routed down or across open wall surfaces except in portions of runs not exceeding 12" in length.
 - d. Raceways shall be painted to match wall finishes, in finished spaces.
 - e. Fittings and boxes used with raceways shall be specifically designed and approved for use with the raceways.
 - f. Raceways may not be routed on or across finished floors.
2. Cut joints shall be square, reamed smooth, and drawn up tight.
 3. Keep conduit plugged, clean, and dry during construction.
 4. Install No. 12 pull wire in empty conduit.
 5. Cap spare conduits.
 6. Provide a watertight conduit system where installed in wet locations such as outdoors, underground, in wash-down areas, or where embedded in concrete.
 7. Conduits may be routed exposed in mechanical equipment, electrical, and utility rooms.
 8. Route all conduits parallel to or at right angles with lines of the building construction and structural members except conduit runs routed concealed in poured-in-place concrete floor slabs may be run in a direct line from source to load.
 9. Make bends and offsets without kinking or destroying smooth bore of conduit. Arrange bends and offsets in parallel conduits to present a neat symmetrical appearance.
 10. Secure conduits in place with malleable corrosion-proof alloy straps or hangers. Conduit straps used in corrosive areas shall be PVC coated.

D. THE USE OF PERFORATED STRAPPING AS A CONDUIT HANGING METHOD IS NOT APPROVED.

1. Conduit runs that extend through areas of different temperature or atmospheric conditions shall be sealed using approved seal off devices, drained, and installed in a manner that will prevent drainage of moisture or gas migration into cabinets, and equipment enclosures.
 - a. Conduits routed within poured concrete construction poured walls, floor slabs, topping slabs, etc.) shall comply with the following requirement.
 - b. Conduits shall be parallel to each other, spaced on center to center distance of at least three times conduit trade diameter, and provided with a minimum of 2 inches concrete covering. Contractor shall note that precast planks below topping slabs may camber. Topping slab thickness will be less at the high point of the camber.
 - c. Conduits larger than 1¼ inches ID shall not be installed in floor slabs. Conduits over ¾ inches ID shall not be installed in topping slabs.
 - d. Conduits embedded in a structural frame slab shall comply with applicable provisions of American Concrete Institute (ACI), Standard 318. Refer to structural drawings for locations of structural frames.
 - e. Conduits used for feeders shall not be embedded in concrete floor slabs or concrete topping slabs.
 - f. Conduits in poured concrete construction shall not cross other conduits or other piping.
 - g. Unless specifically indicated on the electrical plans, conduits installed in (or

under) the poured concrete construction shall be approved by the Engineer prior to conduit installation. The contractor will be required to submit drawings showing conduit sizes and routings to the Engineer for his review. Approval may not be given prior to bidding. Contractors who base their bid on the assumption that conduits will be allowed in concrete construction do so at their own risk. No changes will be made to the contract if, during construction, the Engineer prohibits the installation of conduit in concrete construction.

2. In areas constructed of precast concrete conduits may be run in cores of planks.
3. Connections to Motors and Equipment Subject to Vibration:
 - a. Flexible steel conduit not over 3 ft. long for connection to motorized equipment.
 - b. Liquid-tight flexible conduit not over 3 ft. long where exposed to moisture, dirt, fumes, oil, corrosive atmosphere, with connectors to assure a liquid-tight, permanently grounded connection. Locate so it is least subject to physical abuse. Corrosive areas are identified on the floor plans.
 - c. Use double locknuts and insulated bushings with threads fully engaged.
4. Install bushings with ground lugs and integral plastic linings at equipment with open- bottom conduit entrances.
5. Install conduit expansion fittings where conduits cross expansion joints.

E. FIRESTOPPING

1. Provide firestopping at conduit penetrations through fire rated construction in accordance with the GENERAL ELECTRICAL PROVISIONS specification.

F. CUTTING AND PATCHING

1. Provisions for openings, holes, and clearances through walls, floors, ceilings, and partitions shall be made in advance of construction.
2. Provide cutting, patching and painting necessary for the installation of electrical systems.
3. Where conduits need to penetrate concrete or masonry construction the contractor shall install 22-gauge galvanized steel pipe sleeves, 1 in. larger in diameter than the conduit being installed. Sleeves shall extend 2" above and below the floor slab or wall penetrated. Install sleeves before walls and/or slabs are poured or constructed.
4. The contractor shall prepare drawings indicating size and location of all anticipated floor sleeves for the installation of electrical conduits. Such drawings shall be made available 10 days prior to any scheduled concrete work.

G. RESTRICTIONS

1. Conduits routed parallel to steam lines, hot water pipes, flues, high temperature piping or ducts shall be routed at least 12" from such and shall be a minimum 12" clear when crossing same.
2. Do not route conduit over boiler, incinerator, or other high temperature equipment.
3. Where conduits must cross or follow the same path as water, steam or other fluid piping, run electrical conduits above such piping wherever possible.

H. ADJUSTMENT AND CLEANING

1. Restore damaged areas on PVC jacketed, rigid conduit with spray type touch-up coating compound or as directed by manufacturer
2. Pull cleaning plug through conduits to clear of dirt, oil, and moisture.

I. CONDUIT SYSTEMS

1. Separate raceways shall be provided for each wiring category as follows;
 - a. 120/208 volt or 120/240 volt normal power wiring systems.
 - b. 480 volt normal power wiring systems.
 - c. I&C: analog
 - d. I&C: 120VAC control
 - e. I&C: 24VAC control
 - f. I&C: pulsed frequency
 - g. I&C: field instrument signal
 - h. I&C: fiber-optic

--END OF SECTION--

SECTION 26 6120

LOW VOLTAGE WIRES, CABLES AND CONNECTORS

PART 1. GENERAL

A. RELATED REQUIREMENTS

1. Application provisions of Division 0 and Division 1 shall govern work under this Section.

B. SCOPE

1. Provide wires, cables and connectors as specified herein.

C. QUALITY ASSURANCE

1. Reference Standards of the following associations.
 - a. National Electrical Contractors Association (NECA) - Standard of Installation
 - b. Insulated Cable Engineers Association (ICEA)

PART 2. PRODUCTS

A. WIRE CONDUCTORS

1. Copper Conductor only.
2. Insulated with 90 degree C, 600 volt insulation and color code conductors for low voltage (secondary feeders and branch circuits) as required by code.
3. Type THHN solid or stranded: Single conductor No. 10 AWG and smaller for general use wiring. No. 12 AWG minimum size.
4. Type THW or THHN Stranded: Single conductor No. 8 AWG and larger for general use wiring. Conductor triple rated for use as types THHN, THWN and MTW is approved.
5. Conductors installed in wet locations and areas with high humidity shall be type THW or XHHW. Wet locations shall include, but not be limited to, conduits installed in direct contact with the earth and underground electrical ductbanks.
6. Conductors shall not be installed at temperatures below the manufacturer's minimum installation temperature.

B. CONTROL CONDUCTORS

1. #14 AWG Stranded THHN Copper
2. 90 Degree C insulation
3. Color coded insulation per instrumentation drawing and specification requirements.

C. TWISTED SHIELDED PAIR AND TRIAD INSTRUMENTATION CABLE

1. Twisted pair or triad with #16 AWG Stranded Copper conductors
2. 100% coverage mylar tape shield with tinned copper drain wire
3. PVC Jacket

4. When field instrumentation requires an extra conductor for DC powered instruments provide triad instead of pair at no additional cost to owner.
- D. COMMUNICATIONS CABLES
1. Communications cables shall be the type as called for in the specifications and drawings for the installation of various communications systems.
 2. Communications cables installed in cable trays shall be approved for use in cable tray and shall be of fire resistive construction.
 3. Cables routed exposed through return air ceiling plenums shall be smoke resistance teflon coated cable classified as type CLP or CMP communications cable.
- E. JOINTS, TAPS AND SPLICES
1. Conductors No. 10 AWG and Smaller: 3M Scotch-lok compression type solderless connectors with plastic cover.
 2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless compression type connectors, tool and die applied, of a type that will not loosen under vibration or normal strains. Burndy "Hy-Dent" type or equivalent.

PART 3. EXECUTION

- A. INSTALLATION
1. Run wire and cable in conduit, unless otherwise indicated on drawings.
- B. JOINTS, TAPS AND SPLICES
1. Each tap, joint, or splice in conductors No. 8 AWG and larger shall be taped with two half-lap layers of vinyl plastic electrical tape and a finish wrap of color-coding tape, where required by code. Electrical tape shall be 3M Scotch brand.
 2. Cable splices shall be made only in distribution and junction boxes.
- C. WIRE AND CABLE IDENTIFICATION
1. Install label tags on wire and cable in junction boxes, pullboxes, wireways, and wiring gutters of panels. Tags identify wire or cable number and/or equipment served as shown on drawings.
 2. Different conductor insulation colors and electrical tape colors shall be used to identify the different conductors in a given circuit. Code requirements shall always be followed where applicable. In general, colors shall be as follows;
 - a. 120/240- volt systems neutral conductor - solid white. Provide additional markings for neutral conductors in the same raceway as required by code.
 - b. 120/208-volt systems A-phase, B-phase, and C-phase unswitched legs. Solid black, solid red, and solid blue respectively. Different colors shall be used to identify switched legs.
 - c. 480/277-volt systems neutral conductor - solid gray. Provide additional markings for neutral conductors in the same raceway as required by code.
 - d. 480/277-volt systems A-phase, B-phase, and C-phase unswitched legs. Solid brown, solid orange, and solid yellow respectively. Different colors shall be used to identify switched legs.
 - e. Ground Conductors - solid green. Provide additional markings for ground

conductors in the same raceway as required by code.

D. LIGHTING FIXTURE OUTLETS

1. Use conductor with insulation suitable for current, voltage, and temperature to which conductor will be subjected
2. No. 12 wire size minimum for conductors supplying power to a single fixture. 600V insulation minimum.
3. Insulation suitable for operation at 90 degrees C. minimum for lighting fixtures with integral ballast, mogul base sockets, quartz lamps, or otherwise where subject to excessive temperatures.
4. Fixture wiring shall be continuous wiring system to lampholder or to ballast and from ballast to lampholder.

E. TAGS AND LABELS

1. Provide metal or flame-resistant adhesive label tags and identify the cable source, use and destination.
2. Line voltage conductors shall be identified by circuit number using sleeve type adhesive markers.

--END OF SECTION--

SECTION 26 6122

BRANCH CIRCUITS

PART 1. GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide a branch wiring system to serve lighting, receptacle, instrument, motor and equipment loads as indicated on the drawings and as specified herein.
- C. QUALITY ASSURANCE
 - 1. Reference Standards of the National Electrical Contractors Association (NECA), Standard of Installation.

PART 2. PRODUCTS

- A. NOT USED.

PART 3. EXECUTION

- A. GENERAL
 - 1. Conductors shall be size 12 AWG minimum (unless otherwise noted) for branch circuit wiring, including motor circuits.
 - 2. Size 120V branch circuits for length of run on following basis:
 - a. 0 to 75 ft run from panelboard to first outlet: No. 12 AWG minimum.
 - b. 75 to 125 ft run: increase one wire size, i.e., No. 12 AWG becomes No. 10 AWG.
 - c. 126 to 200 ft run: increase two wire sizes, i.e., No. 12 AWG becomes No. 8 AWG.
 - d. 201 and above: wiring to be sized for 3% maximum voltage drop.
 - 3. Provide individual neutral conductors for branch circuits serving isolated ground receptacles and computer equipment. (No common neutrals for these circuits.)
 - 4. Voltage drop for branch circuits and feeder circuit combined shall not exceed requirements of NEC Article 220.
 - 5. Route branch circuits and switch legs as dictated by construction, these specifications, or instruction from Engineer.
 - 6. Size conduit, outlet boxes, and other raceway system components in accordance with NEC requirements as minimum.
 - 7. Do not draw conductor into conduits until building is enclosed and watertight and work which may cause cable damage has been completed.
 - 8. Circuit numbers as shown on drawings are for Contractor to plan his wiring and for estimating purposes and are not necessarily the exact circuit numbers to be

used in that panel for that particular load. Exact circuit numbers for each load are to be selected by the Contractor at his option. Balanced load on panelboard bus is to be determining factor in arrangement of circuits. Panelboards average load shall not differ from phase to phase by +/- 7½%.

B. MOTOR AND EQUIPMENT WIRING

1. Furnish and install motor circuits in accordance with any schedules on drawings and code requirements, from source of supply to associated motor starter, and from starter to motor terminal box, including necessary and required intermediate connections.
2. Conductor and conduit size for motor branch circuits, if shown on drawings, are sized for motor requirement only.
3. Motors shall have proper feeders as per NEC and nameplate ratings. Contractor is responsible for verification of ratings of motors and installing proper branch circuits.
4. Obtain manufacturer's wiring diagrams and shop drawings for equipment requiring electrical connections.
5. Check drawings and specifications of other divisions of work for equipment and work which shall be included in order to provide a complete electrical installation.
6. Motor connections shall be made by compression type connectors using proper tools and fittings to assure good electrical continuity and low resistance joint.

C. INSPECTION

1. Examine areas and conditions under which branch circuits are to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of work.
2. Do not proceed with work until unsatisfactory conditions have been corrected.

D. INSTALLATION

1. Install in accordance with manufacturer's written instructions and in accordance with recognized industry practices
2. Install branch circuit and control wiring system as indicated in drawings.
3. Use color-coding to identify conductors as indicated in LOW VOLTAGE WIRES, CABLES AND CONNECTORS specification.
4. Do not splice conductors without written authorization.

--END OF SECTION--

SECTION 26 6130

ELECTRICAL BOXES

PART 1. GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide electrical boxes in accordance with these specifications.
- C. QUALITY ASSURANCE
 - 1. Reference Standards of the National Electrical Contractors Association (NECA), Standard of Installation.

PART 2. PRODUCTS

- A. INTERIOR WALL OUTLET AND SWITCH BOXES - SURFACE MOUNTED – DRY, DAMP OR WET LOCATION
 - 1. Single or two gang as indicated on the plans. Cast malleable iron with threaded conduit hubs. Two inches deep minimum. Internal mounting ears. Boxes shall be coated with electroplated zinc, a dichromate coating, and an aluminum polymer enamel finish. Refer to CONDUITS specification for restrictions on exposed conduit systems.
- B. EXTERIOR WALL OUTLET AND SWITCH BOXES - SURFACE MOUNTED
 - 1. Single or two gang as indicated on the plans. Cast malleable iron with threaded conduit hubs. Two inches deep minimum. Internal mounting ears. Boxes shall be coated with electroplated zinc, a dichromate coating, and an aluminum polymer enamel finish. Refer to CONDUITS specification for restrictions on exposed conduit systems.
- C. CEILING BOXES - SURFACE MOUNTED – DRY, DAMP AND WET AREAS
 - 1. Single or two gang as indicated on the plans. Cast malleable iron with threaded conduit hubs. Two inches deep minimum. Internal mounting ears. Boxes shall be coated with electroplated zinc, a dichromate coating, and an aluminum polymer enamel finish. Refer to CONDUITS specification for restrictions on exposed conduit systems.
- D. ELECTRICAL BOXES IN CORROSIVE LOCATIONS
 - 1. PVC coated cast steel boxes compatible with conduit system installed. Coating shall cover both interior and exterior surfaces. See floor plans for identification of corrosive areas.
- E. SPECIAL BOXES

1. Provide special boxes fabricated by the manufacturer of fixtures and other devices where standard outlets are not applicable.
- F. ACCESS PANELS
1. Furnish type necessary for the particular wall or ceiling construction in which they occur.
 2. Panels to be complete with screwdriver cam locking device.
- G. WEATHERPROOF JUNCTION AND PULL BOXES (EXTERIOR AND DAMP/WET INTERIOR AREAS)
1. Stainless steel or cadmium plated malleable iron cast type with threaded hubs, cast cover, and neoprene gasket.

PART 3. EXECUTION

- A. INSTALLATION
1. Install electrical boxes as indicated, in compliance with NEC requirements, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that the boxes serve the intended purposes.
 2. Seal conduit at entrance to weatherproof boxes for interior and exterior locations exposed to weather or moisture.
 3. Install knockout closures to cap unused knockout holes where blanks have been removed
 4. Locate boxes so as to assure accessibility of electrical wiring. Relocate boxes rendered inaccessible by the installation of work by other trades.
 5. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry. Do not support from conduit.
 6. Set boxes, in concealed conduit runs, flush with wall surfaces, with or without covers, as required.
 7. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall a minimum 12 inches.
 8. Set outlet boxes parallel to construction, securely mounted and adjusted to set true and flush with the finished surface.
 9. Do not burn conduit holes, use knock-out punches, or hole saws.
 10. Use "no-bolt" studs where required.
 11. Boxes shall be sized per code to accommodate the number and size of conduit entrances to the box and to accommodate the number of conductors, splices, fittings, etc. within the box. Do not use box extensions to create additional volume to meet NEC requirements for the number of conductors contained in a box.
- B. EXPOSED OUTLET AND JUNCTION BOXES
1. Install weatherproof outlet and junction boxes outdoors and in any area where drawings show weatherproof (WP) wiring devices.
- C. INTERIOR OUTLET BOX ACCESSORIES
1. Provide outlet box accessories as required for each installation, such as mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps, and

metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

D. LIGHTING FIXTURE OUTLET BOXES

1. Securely mount with approved type bar hangers spanning structural members to support weight of fixture.
2. Do not support from conduit.
3. Equip with 3/8-inch fixture studs and tapped fixture ears, for surface mounted or pendant mounted lighting fixtures. Fixture studs shall be provided for mounting of all lighting fixtures exceeding 25 lbs. in weight. Fixture studs shall be attached through knockouts at the top of the box.
4. Provide additional attachments from structure for outlet boxes supporting lighting fixtures weighing in excess of 25 lb.
5. Provide cast outlet boxes for lighting fixtures in wet or damp areas.

E. OUTLET BOX LOCATIONS

1. Locate flush mounted wall boxes in corner of nearest brick or block to keep cutting to a minimum.
2. Location of outlets and equipment as shown on drawings is approximate, and exact location is to be verified and shall be determined by:
3. Construction or code requirements.
4. Conflict with equipment of other trades.
5. Equipment manufacturer's drawings.
6. Where receptacles and communications outlets are shown grouped next to each other on the drawings, the boxes for these outlets shall be mounted next to each other and shall not be located according to stud spacing. The Contractor shall utilize between stud box supports to assist in mounting boxes proximal to one another on a consistent spacing between wall studs.
7. Minor modification in the location of outlets and equipment is considered incidental up to a distance of 10 feet, provided the change in location is requested prior to rough in.
8. Mounting heights for devices and equipment to be measured from finished floor to centerline of device.

F. FLOAT SWITCH CABLE JUNCTION BOXES

1. Provide a NEMA 4X junction box for each group of float switches shown on the drawings. Provide each junction box whether the box is shown on the drawings or not. It is required to enable transition from waterproof float switch cable, to wire in conduit.
2. Install each junction box above the liquid level in an accessible location enabling future access.
3. Each penetration to each junction box shall be made in a manner that maintains the NEMA 4 integrity of the box. Refer also to CONDUIT FITTINGS specification section.

G. SUBMERSIBLE PUMP/MIXER CABLE JUNCTION BOXES

1. Provide a NEMA 4X junction box for each submersible pump shown on the drawings. Provide each junction box whether the box is shown on the drawings or not. It is required to enable the separation of the moisture detection conductors and the high temperature conductors from the pump's power conductors. It is

also required to enable transition from (waterproof) pump/mixer cable, to wire in conduit.

2. Install each junction box above the liquid level in an accessible location enabling future access.
3. Each penetration to each junction box shall be made in a manner that maintains the NEMA 4 integrity of the box. Refer also to CONDUIT FITTINGS specification section.
- 4.

--END OF SECTION--

SECTION 26 6140

WIRING DEVICES

PART 1. GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Division 0 and Division 1 shall govern work in the Section.
- B. SCOPE
 - 1. Provide wiring devices generally consisting of switches and receptacles as indicated on the drawings and as specified herein.
- C. SHOP DRAWING SUBMITTALS
 - 1. Listing of brand names and types of materials proposed for use.
 - 2. Nameplate nomenclature.
 - 3. Electrical ratings.

PART 2. PRODUCTS

- A. ACCEPTABLE MANUFACTURERS
 - 1. Use of manufacturer's name and model or catalog number is for purpose of establishing standard of quality and general configuration desired only.
 - 2. Arrow-Hart, Inc.
 - 3. Hubbell Wiring Device Div.
 - 4. Pass and Seymour, Inc.
 - 5. Crouse-Hinds
 - 6. Leviton
 - 7. General Electric
- B. GENERAL
 - 1. Provide factory-fabricated, NEMA specification grade wiring devices in type, color, and electrical rating for service indicated.
 - 2. Provide wiring devices of one manufacturer.
 - 3. See Symbols List on drawings for identification of device type.
 - 4. Wiring devices for use with stranded conductor shall have a clamping type terminal that can be physically tightened. The clamping device shall not be a spring type of clamp.
- C. SWITCHES
 - 1. Single Pole Switch:
 - a. Hubbell Model 1221-I.
 - b. Arrow-Hart. Model 1991-I.
 - c. Or equal.
 - 2. Double Pole Switch:
 - a. Hubbell. Model 1224-I.

3. Arrow-Hart Model 1992-I, Or equal.
4. Three-way Switch:
 - a. Hubbell. Model 1223-I.
 - b. Arrow-Hart. Model 1993-I.
5. Indicator Switch:
 - a. Hubbell. Model 1221-II.
 - b. Arrow-Hart. Model 1921-IL.
 - c. Or equal.
6. Locator Switch:
 - a. Hubbell. Model 1221-PL.
 - b. Arrow-Hart. Model 1991-PL.
 - c. Or equal.
7. Weather Proof Switch:
 - a. Hubbell. Model 1221/Crouse-Hinds DC 1SBG Cover
 - b. Or equal.
8. Explosion Proof Switches:
 - a. Appleton. Model EFS Series.
 - b. Crouse-Hinds. Model EFS Series.

D. RECEPTACLES

1. Duplex Convenience Receptacle:
 - a. Hubbell. Model 5262-I.
 - b. Arrow-Hart. Model 5262.
 - c. Or equal.
2. GFCI Receptacle:
 - a. Hubbell Model GF – 5362 – Indoor with WPFS26 Outdoor.
 - b. Or equal.
3. Explosion-proof Receptacle:
 - a. Appleton Model EFS B175-2023M.
 - b. Crouse-Hinds Model ENR 21201.
 - c. Or equal.

A. WIRING DEVICE PLATES AND COVERS

1. Provide wall plates for wiring devices, with ganging and cutouts as indicated and with metal screws for securing plates to devices, screw heads colored to match finish of plate.
2. Device plates for surface mounted Type FS or FD boxes: Type FSK galvanized steel cover.
3. Device plates for surface mounted 4-inch square boxes: ½ in. raised galvanized steel covers.
4. Plates and covers for exterior outlet boxes and exterior switch boxes in damp or wet locations: Stainless steel with gasketed, lift, spring close, locking coverplate. Pass and Seymour model number WP26-L.

PART 3. EXECUTION

A. INSPECTION

1. Examine areas and conditions under which wiring devices are to be installed and notify Engineer, in writing, of conditions detrimental to proper and timely completion of work.

2. Do not proceed with work until unsatisfactory conditions have been corrected.

B. INSTALLATION

1. Install in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices.
2. Do not install devices until wiring is complete.
3. Do not install devices until after wall finishes (wall covering, painting, etc.) have been completely applied. Any outlets installed prior to walls being finished and used for construction power shall be replaced at the time of substantial completion.
4. Before installing receptacles and switches, clean electrical boxes of dirt and debris.
5. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or otherwise. Make circuit connections via wire connectors and pigtails.
6. Install gasket plates for devices or system components having light emitting features, such as switches with pilot lights. Where installed on rough textured surfaces, seal plates with black self-adhesive poly-foam.
7. Ground receptacles with an insulated green ground wire from device ground screw to a bolted outlet box connection. Route a continuous green equipment grounding conductor with branch circuit conductors serving isolated ground receptacles. Terminate the equipment ground on the ground bus in panelboards.
8. Install emergency switches which occur adjacent to normal light switches in separate boxes to maintain systems isolation in accordance with the NEC. Provide red wiring devices and coverplates for devices wired to emergency power circuits.
9. Stranded conductor terminating on wiring devices shall be terminated in a clamping terminal and not on the screw terminal.
10. Provide a layer of electrical tape around the perimeter sides of each wiring device so that the terminations are insulated.
11. Where GFI protected receptacles are indicated on the plans, each receptacle indicated shall be a GFI receptacle. Standard receptacles protected with an upstream GFI receptacle shall not be approved.

C. FIELD QUALITY CONTROL

1. Provide operational testing for all devices.
2. Test receptacles with Hubbell 5200, Woodhead 1750, or equal, for correct polarity. proper ground connection and wiring faults.

--END OF SECTION--

SECTION 26 6190

SUPPORTING DEVICES

PART 1. GENERAL

A. RELATED REQUIREMENTS

1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section

B. SCOPE

1. Provide equipment for the support of electrical equipment as detailed or indicated on the drawings and as specified herein.

C. QUALITY ASSURANCE

- a. Reference standards of the following agencies;
- b. National Electrical Contractors Association (NECA), Standard of Installation.
- c. National Electrical Manufacturers Association (NEMA).

PART 2. PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Kindorf, Midland-Ross Corp.
2. Elcen Co.
3. Steel City, Midland-Ross Corp.
4. Unistrut
5. B-Line

B. GENERAL

1. Metal supporting devices shall be zinc galvanized or cadmium plated steel or malleable iron.

C. LIGHTING FIXTURE SUPPORT

1. Items such as stems, hickies, bar hangers, and clips are required to securely attach fixtures to ceilings or walls.
2. Provide studs and Unistrut support for fixture outlet and ceiling support.
3. Drilled expansion insert type anchors are suitable for load and application requirements such as sleeve anchors, lag shields, and plastic anchors.
4. Provide auxiliary supports so that fixtures can be drawn up tightly, cannot be tilted or rotated, and will not be affected by vibrations.

D. SUPPORT STRUCTURES

1. Rack supports of galvanized steel channel sections with adequate feet to allow secure mounting.
2. Weld sections-do not use bolts.

E. MOUNTING PANELS

1. Size mounting panels to mount necessary equipment, of $\frac{3}{4}$ in. exterior grade plywood or as specified on drawings.
 2. Provide mounting panels for all surface mounted electrical cabinets and enclosures for electrical equipment.
 3. Provide uniform mounting panels as far as practical. Preferred sizes being 12 in. X 18 in., 18 in. X 24 in., 18 in. X 30 in., and 24 in. X 30 in.
- F. CONDUIT SUPPORTS
1. Two-hole galvanized steel straps.
 2. Continuous slot or T-slot galvanized steel concrete insert channel.
- G. TRANSFORMER MOUNTING BRACKETS
1. Provide mounting brackets fabricated of welded galvanized steel channel section.
 2. Design bracket to support the size transformer as indicated on drawings.

PART 3. EXECUTION

- A. PREPARATION
1. Install hangers, supports, and anchors only after structural work, where work is to be installed, has been completed. Correct inadequacies such as proper placement of inserts, anchors and other building structural attachments.
 2. Examine areas and conditions under which equipment and associated components are to be installed and notify Engineer, in writing, of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.
 3. Determine that ceiling channel system is adequately supported to receive and support lighting fixtures. Where deemed inadequate, do not install fixtures until additional support is provided.
- B. INSTALLATION OF BUILDING ATTACHMENTS
1. Install building attachments at required locations within concrete or on to structural steel or raceway and equipment support.
 2. Install additional building attachments where support is required for additional concentrated loads.
 3. Install concrete inserts before concrete is placed.
- C. INSTALLATION OF ANCHORS
1. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment.
 2. Installation methods shall be in conformity with the manufacturer's recommendations for maximum holding power, but in no case shall the depth of hole be less than four bolt diameters. Minimum distance between the center of any expansion anchor and an edge of exterior corner of concrete shall be not less than $4\frac{1}{2}$ times the diameter of the hole in which it is installed.
- D. SUPPORT OF CONDUIT
1. Fasten conduit to structural parts of building in a manner acceptable to Engineer.
 2. Do not use perforated hanger iron.

3. Install concrete insert channel as required, with spacings as recommended by manufacturer. Install with anchor and caps, insert joiner clips and closer seals as required.
 4. Support conduit as follows:
 - a. Single Conduit Runs
 - i. Vertical Surfaces: Galvanized, heavy duty, sheet steel straps; back straps to be provided for all exposed conduit and conduit on exterior walls.
 - ii. Horizontal Surfaces: Galvanized, heavy duty, 2-hole steel pipe straps.
 - b. Multiple Conduit Runs
 - i. Vertical Surfaces: Horizontal or vertical rack channel with conduit straps as required.
 - ii. Horizontal Surfaces: Single or double rack channel trapeze, complete with conduit straps as required; all supported with threaded hanger rods.
 - c. Conduit extending through roof shall pass through a ceiling box at roof lines.
 - d. Provide 14-gauge minimum copper box complete with watertight soldered seams and flanged to serve as pitch pocket for each conduit.
 - e. Conduit and pitch pocket shall be installed in advance of roofing work.
- E. TRANSFORMER SUPPORTS
1. Install auxiliary transformer wall mounting brackets where all mounted transformers are indicated on drawings.

--END OF SECTION--

SECTION 26 6402

UNDERGROUND ELECTRIC SERVICE

PART 1. GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable provisions of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide facilities for an underground electrical service as indicated on the drawings and as specified herein.
- C. QUALITY ASSURANCE
 - 1. Reference the local electrical utility's Service Rules and Regulations.
- D. SUBMITTALS
 - 1. Submit shop drawings of service entrance equipment for approval by the Electrical Utility before submitting approved drawings to Engineer.

PART 2. PRODUCTS

- A. ELECTRIC SERVICE
 - 1. Electric service characteristics for this project shall be as indicated on drawings.

PART 3. EXECUTION

- A. PREPARATION
 - 1. Confirmation of electric service. Consult with Electric Utility to verify service information specified herein and shown on drawings before submitting bid.
 - 2. Metering.
 - a. Consult with Electric Utility regarding service entrance requirements and metering equipment.
 - b. Install metering equipment and empty conduit for metering conductors to meet standards and requirements of Electric Utility.
 - c. Install transformer pads to meet standards and requirements of Electric Utility.
- B. SERVICE INSTALLATION
 - 1. The service installation shall comply with the latest applicable standards of the utility. Refer to the current electrical service installation manuals.
 - 2. The Contractor shall meet with the electric utility prior to rough-in, to review and coordinate the installation of the electrical service and verify existing conditions and any special requirements.
 - 3. If requested by the Owner, Utility or Engineer, the Contractor shall meet with the Utility at the project site at the time of new service installation.

--END OF SECTION--

26 6450

GROUNDING

PART 1 GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable provisions of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide all material, labor and incidentals necessary for the completion of this section of the work.
- C. QUALITY ASSURANCE
 - 1. Follow the requirements of the following regulatory agencies;
 - a. National Fire Protection Association (NFPA), NFPA-70 - National Electrical Code (NEC) and Wisconsin amendments thereto.
 - b. Local Codes and Ordinances
- D. REFERENCE STANDARDS
 - 1. Conform to the standards of the National Electrical Contractors Association (NECA), Standard of Installation.
- E. SUBMITTALS
 - 1. Ground rod locations.
 - 2. Ground resistance at each ground rod.
 - 3. Soil conditions.
 - 4. Building water service resistance (Not Required).

PART 2 PRODUCTS

- A. GROUND CLAMPS
 - 1. Ground clamp fittings shall be interlocking clamp type fabricated from high strength corrosion-resistant metal with high strength silicon bronze U-bolt, nuts, and lock washers.
- B. GROUND RODS
 - 1. Thick copper covering inseparably welded to a strong steel core.
 - 2. ¾ in. diameter minimum
 - 3. Ten feet long minimum
 - 4. Furnish and install three rods, positioned in a triangular pattern (spaced 15 feet apart) to achieve 5 ohms or less.
- C. GROUND WIRES
 - 1. Copper only
 - 2. Size as shown on drawings, or as required by NEC
 - 3. No. 6 AWG minimum

PART 3 EXECUTION

- A. GENERAL
1. Ground electrical systems and equipment as required by code, utility, local ordinances, and to requirements herein.
 2. Install separate code rated grounding conductors to special equipment and activity areas as required by code.
 3. Bond all metallic piping systems and service equipment as required by NEC.
 4. Cable connections and joints shall be thermo-welded.
- B. SYSTEM GROUND
1. Grounding electrode conductor shall be permitted to be attached to other grounding electrodes where available in the building as defined in NEC Article 250-81 in lieu of attaching to water service.
 2. Piping system ground shall be augmented by 2 NEC approved grounding electrodes so as to achieve an effective ground resistance as required by code and as shown on the plans. Building steel shall be used where available.
 3. Drive ground rods to a depth 4 inches below finished grade.
 4. Grounding electrode conductor.
 - a. Continuous without splice from nearest building grounding electrode. Ground to service equipment.
 - b. Install in rigid metal conduit securely fastened to pipe.
 - c. Attach non-ferrous metal tag to warn against removal.
 - d. Make connections to ground electrodes with approved molded exothermic weld process.
- C. EQUIPMENT GROUND
1. Bond metallic conduits, supports, cabinets, and other equipment so ground will be electrically continuous from service to outlet boxes.
 2. Install grounding conductor in nonmetallic and flexible conduit to complete equipment ground continuity. Ground wire shall be bonded at equipment and at first junction box of conduit system on line side of flexible conduit to the system.
 3. Install grounding conductors to permit shortest and most direct path from equipment to ground. When grounding conductor runs through metallic conduit, bond to conduit at entrance and exit with a bolted clamp.
 4. Ground neutral at service-entrance only.
 5. Install a separate equipment grounding conductor in each conduit containing feeder conductors.
 6. Install a green equipment grounding conductor in all conduits serving receptacles and special purpose outlets.
 7. Green ground bar in panels: shall be similar to neutral bar, except tinted green and bonded to panel tub.
 8. Connections shall be accessible for inspection and checking. No insulation shall be installed over ground connections.
 9. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.
 10. Attach grounds permanently before permanent building service is energized.
 11. Attach ground wire neatly and firmly to walls.
- D. FIELD QUALITY CONTROL
1. Contractor shall make ground resistance measurements. Measure in normally dry conditions, not less than 48 hours after rainfall.
 2. Report ground resistance measurement to Engineer within 48 hours of measurement.

--END OF SECTION--

SECTION 26 6475

LOW VOLTAGE OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

A. RELATED REQUIREMENTS

1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.

B. SCOPE

1. Provide overcurrent devices of the sizes and interrupting ratings as indicated on the drawings and as specified herein.

C. SUBMITTALS

1. Shop Drawings
2. Device dimensions, nameplate nomenclature and electrical ratings.
3. Product data sheets with installation instructions.
4. Time current characteristic curves for each size and type of device.

PART 2 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Fuses.⁷⁵
 - a. Bussmann
 - b. Chase Shawmut
 - c. Approved Equal.
2. Molded case circuit breakers.
 - a. Square D/Schneider Electric
 - b. Westinghouse/Cutler-Hammer/Eaton Co.
 - c. Siemens

B. 250 VOLT FUSE TYPES

1. Class RK-1, one end rejection or to fit mountings specified. 0-600 ampere, 200,000 ampere interrupting rating. Equivalent to Bussmann Low-Peak. LPN-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder and main service protection.

C. 600 VOLT FUSE TYPES

1. Class RK-1, one-end rejection or to fit mountings specified, 0-600 ampere, 200,000 ampere interrupting rating. Equivalent to Bussmann Low-Peak. LPS-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder and main service protection.
2. Class L, bolt-in, 601-6,000 amperes, 200,000 ampere interrupting rating. Equivalent to Bussmann HI-CAP. KRP-C, time delay for overload and short circuit protection for motor, transformer, feeder and main service protection.
3. Class CC, fast acting, single element, 0-30 amperes, 200,000 ampere interrupting rating. Equivalent to Bussmann Limitron KTK-R standard non-rejection, UL listed for motor control circuits, lighting ballasts, control transformers and street lighting fixtures.

- D. SPARE FUSES
 - 1. Provide 100% spare (minimum of three) of each type and rating of installed fuses.
- E. LIGHTING PANEL CIRCUIT BREAKERS
 - 1. Thermal and magnetic protection.
 - 2. Single-handle common trip, two and three poles (handle ties not acceptable).
 - 3. Bolt-on type.
 - 4. Quick make and break toggle action.
 - 5. Handle trip indication.
 - 6. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
 - 7. UL listed for type and temperature rating of wire specified.
 - 8. UL listed short circuit rating (integrated equipment rating):
 - a. Up to 240V: 10,000 RMS symmetrical amperes minimum.
 - b. Up to 480V: 14,000 RMS symmetrical amperes minimum.
 - 9. UL SWDL switching duty on 120V circuits where loads are panel switched.
- F. POWER PANEL AND MOTOR CONTROL CENTER CIRCUIT BREAKERS
 - 1. Thermal and magnetic protection.
 - 2. Magnetic protection only, in combination with motor starters and motor circuit protectors (MCP).
 - 3. Single magnetic trip adjustment.
 - 4. Single-handle common trip, two and three poles (handle ties not acceptable)
 - 5. Push-to-trip test button.
 - 6. Breakers shall plug on to panel bussing but breaker cases shall be bolted to panel housing.
 - 7. Quick make and break toggle action.
 - 8. Handle trip indication.
 - 9. Handle position indication, ON in up position, OFF in down position, and TRIPPED center.
 - 10. UL listed for type and temperature rating of wire specified.
- G. CURRENT LIMITING CIRCUIT BREAKERS
 - 1. One current limiter per pole.
 - 2. Blown current limiter to trip all poles.
 - 3. UL Listed Short Circuit Rating: 100,000 RMS symmetrical amperes.
 - 4. Other features as specified above.

PART 3 EXECUTION

- A. INSPECTION
 - 1. Examine fusible equipment for size and type of fuse to ensure selective coordination.
 - 2. Install fuses only after selective coordination has been made.
- B. INSTALLATION
 - 1. Install in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices.
 - 2. All overcurrent protection devices by same manufacturer.
 - 3. Circuit breakers shall be factory installed in enclosures.
 - 4. Fuses shall not be installed until equipment is ready to be energized.

C. ADJUSTMENT

1. Adjustable settings on circuit breakers shall be set to provide selective coordination, proper operation and compliance with NEC.

CI. FIELD QUALITY CONTROL

1. Test and/or permanently record the following:
2. Fuses
 - a. Equipment nameplate requirement
 - b. Actual fuse rating
3. Circuit Breakers
 - a. Nameplate data
 - b. Actual trip setting

--END OF SECTION--

SECTION 26 6481

MOTOR STARTERS

PART 1 GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.
- B. SCOPE
 - 1. Provide and install motor starters of the types as indicated on the drawings and as specified herein
- C. SUBMITTALS
 - 1. Shop Drawings
 - 2. Showing enclosure dimensions, nameplate nomenclature, electrical ratings and thermal unit schedule.
 - 3. Product data sheets with printed installation instructions.
 - 4. Wiring diagrams and schematics.
 - 5. Identify with tag number for proposed use.
 - 6. Operating and Maintenance Data
 - 7. Manufacturer's printed instructions for replacing parts, performing cleaning and operating and maintaining motor starters.
 - 8. Repair parts list.
 - 9. Field quality control test results.
- D. PRODUCT DELIVERY, STORAGE AND HANDLING
 - 1. Do not store motor starters exposed to weather.
 - 2. Protect motor starters against damage from work of other trades.

PART 2 PRODUCTS

- A. GENERAL
 - 1. Use of a manufacturer's name and model or catalog number is for purpose of establishing standard of quality and general configuration desired only.
 - 2. Starters shall be by one manufacturer.
- B. ACCEPTABLE MANUFACTURERS
 - 1. Allen Bradley
 - 2. Cutler-Hammer/Westinghouse/Eaton
 - 3. Square D/Schneider Electric
 - 4. Siemens
- C. MANUAL MOTOR STARTER CONSTRUCTION
 - 1. Quick-make and break toggle action.
 - 2. Double-break silver alloy contacts.
 - 3. One-piece bi-metallic or melting alloy type thermal overload units.

4. Starter inoperative, unless thermal unit is in position.
5. Provision for padlocking in the "off" position.
6. Green pilot light to indicate when motor is running.
7. NEMA standards for size and horsepower rating.
8. Provisions for resetting starter after overloads trip the starter.

D. MAGNETIC COMBINATION TYPE MOTOR STARTER CONSTRUCTION

1. Built-in circuit breaker type disconnect switch with external disconnect handle with capability to padlock in the open position. Size circuit breaker as indicated on the drawings.
2. Mounted in vertical position.
3. Double-break silver alloy contacts.
4. Molded coil through Size 6.
5. Wound, taped, varnished and baked coils Sizes 7 and 8.
6. Contacts and coil replaceable without removing starter from enclosure or power wiring from starter
7. Straight-through wiring.
8. Overload Relay - General Application
9. One-piece thermal unit construction.
10. One bi-metallic or melting alloy type overload relay per phase, manually reset.
 - a. Interchangeable thermal units.
 - b. Thermal units must be in place to operate starter.
 - c. Replaceable overload relay circuit contacts.
 - d. Trip at 6 times FLA in 20 seconds.
11. Overload Relay - Submersible Pumps and Hermetically Sealed Motors
 - a. One-piece thermal unit construction.
12. One bi-metallic or melting alloy type overload relay per phase, manually reset.
 - a. Interchangeable thermal units.
 - b. Thermal units must be in place to operate starter.
 - c. Replaceable overload relay circuit contacts.
 - d. Trip at 6 times LRA in 3-5 seconds.
13. NEMA standards for size and horsepower ratings.

NEMA Size	Max HP @ 208V	Max HP @ 480V
1	7½	10
2	10	25
3	25	50
4	40	100
5	75	200
6	150	400

14. NEMA Size 1 minimum, or as noted on drawings.
15. Control Circuits
 - a. Provide a control transformer mounted in starter enclosure. Verify the control voltage required with the temperature control contractor.
 - b. Two fuses on control transformer primary side and single fuse on secondary line.
 - c. One secondary line grounded.
 - d. Transformer sized for device, accessories connected there to and 25% extra capacity minimum.

16. Accessories
 - a. Reset button mounted in enclosure cover.
 - b. Heavy duty, oil-tight, green "running", and red "off" lights mounted in enclosure cover.
 - c. Heavy duty, oil-tight, Hand-Off-Auto selector switch mounted in enclosure cover.
 - d. Furnish two normally open and one normally closed auxiliary contacts in each starter.
 - e. Make provisions for mounting in a motor control center where indicated on the drawings.
- E. ENCLOSURES
 1. Indoor dry
 - a. MANUAL STARTERS: General purpose flush mounted in finished areas or NEMA 1 surface mounted in unfinished areas.
 - b. MAGNETIC STARTERS: NEMA 1 surface mounted.
 - c. SOLID STATE STARTERS: NEMA 1 surface mounted.
 2. Indoor damp or below grade
 - a. NEMA 3R.
 3. Outdoor or indoor wet
 - a. NEMA 4.
 4. Corrosive Area
 - a. NEMA 4X stainless steel.
- F. NAMEPLATES
 1. Engraved laminated plastic.
 2. Letters 1/2 in. high.
 3. Black letters on white background. Approved equal contrast options.

PART 3 EXECUTION

- A. INSPECTION
 1. Examine area to receive motor starter to assure adequate clearance for motor starter installation.
 2. Start work only after unsatisfactory conditions have been corrected.
- B. INSTALLATION
 1. Install in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized practices.
 2. Install mounted firmly to wall of structural surface. Refer to plumbing plans and heating, ventilating and air conditioning plans for starter locations.
- C. FIELD QUALITY CONTROL
 1. Megger check of phase-to-phase and phase-to-ground insulation levels. Do not megger check solid state equipment.
 2. Test for continuity between line and load terminals and between control terminals.
 3. Short circuit.

4. Operational check.
 5. Test each motor and permanently record following information:
 - a. Motor identification as to the load served.
 - b. Nameplate data.
 - c. Overload relay equipment.
 - d. Protective relay (if any) setting.
 - e. Voltage and current phase readings.
 - f. Direction of rotation.
 - g. Furnish spare overloads in each size utilized and turn over to owner.
 - h. Provide a spare control transformer for each starter size utilized and turn over to owner.
- D. ADJUSTMENT AND CLEANING
1. Adjust covers and operating mechanisms for free mechanical movement.
 2. Tighten wire and cable connections.
 3. Verify over current protection thermal unit size with motor nameplate to provide proper operation and compliance with NEC.
 4. Clean interior of enclosure.
 5. Touch up scratched or marred surfaces to match original finish.

--END OF SECTION--

SECTION 26 6483

ADJUSTABLE SPEED CONTROLLERS (ASC)

PART 1. GENERAL

A. SECTION INCLUDES

1. Detailed design, fabrication, installation, and testing of adjustable speed controller systems as scheduled and as shown on the drawings.

B. SUBMITTALS

1. SHOP DRAWINGS: Submit under the provisions of Section 01300. A reviewed set will be returned to the supplier for fabrication. The shop drawings shall include the following:
 - a. Prior to shop drawing submittal for adjustable speed controller systems, obtain detailed motor load information from equipment manufacturer.
 - b. Submit system hydraulic analysis including graphs and tabular information for the following:
 - i. Input horsepower versus flow (minimum design flow to maximum design flow) taking into account pump, AFD and motor efficiencies.
 - ii. System curve versus pump curve at 100 percent speed and in 10 percent increments until minimum pump speed at which pump does not generate enough head to overcome static head is reached. Plots must also show curves of constant hydraulic horsepower to verify non-overloading.
 - iii. Tabulated data shall be calculated at 2 +percent speed increments.
 - c. Submit harmonic voltage distortion analysis based upon the minimum three phase bolted fault short circuit current available at the point of service. Submittal data shall not relieve supplier of specified performance requirements. Analysis shall include:
 - i. Calculate percent voltage distortion, with respect to fundamental voltage, for all harmonics up to the 48th.
 - ii. Comparison with IEEE 519 standards for acceptable voltage distortions on such systems.
 - d. Submit detailed list of any proposed deviations from these specifications.
 - e. Submit experience certification upon request including Owner name, address, and telephone number for systems of similar size and type.
2. OPERATION AND MAINTENANCE MANUALS: Include as part of the equipment operation and maintenance manual.
3. SPARE PARTS LIST: Provide vendor's name, address, and phone numbers for spare parts.

C. PROJECT RECORD DOCUMENTS

1. Submit project record documents.
2. Submit harmonic distortion analysis test results showing actual field measurements of harmonic distortion.

D. DELIVERY, STORAGE AND HANDLING

1. Deliver, store, protect, and handle products according to the written instructions of manufacturer.

E. WARRANTY

1. Provide three years of Manufacturer's warranty covering equipment, software, configuration, and labor from Owner's Acceptance.

F. GENERAL DESIGN REQUIREMENTS

1. This design is based upon the named manufacturer, if substitute equipment is offered, the contractor shall be responsible for all modifications including but not limited to components, interconnection wiring, space requirements, and equipment layout. All modifications shall be subject to approval by Engineer and provided at no additional cost to the Owner.
2. Like components of all systems, although for different service, shall be the end products of a single manufacturer.
3. It shall be the responsibility of the Contractor to provide a complete and fully operable adjustable speed controller system for each unit identified elsewhere in the specifications and on the drawings.

G. STANDARDS

1. IEEE Standards 519-1992.
2. UL listing/labeling Standard UL508C.
3. CSA
4. EMA ICS 3.1
5. Manufacturer shall be ISO 9001 or ISO 9002 certified.

PART 2. PRODUCTS

A. APPROVED MANUFACTURERS

1. ABB
2. Allen-Bradley
3. Eaton Cutler-Hammer

B. GENERAL

1. Provide adjustable speed controller systems capable of converting the specified voltage, 3-phase, 60 Hz, input power into variable voltage, adjustable frequency, 3-phase output of suitable capacity and waveform to serve as input power to squirrel cage induction motors.
2. Harmonic Distortion:
 - a. The adjustable speed controller systems shall operate satisfactorily when connected to a bus supplying other solid state power conversion equipment which may be causing up to 10 percent total harmonic voltage distortion and commutation notches up to 36,500 volt microseconds, or when operated from the same bus.
 - b. Individual or simultaneous operation of the adjustable speed controller systems shall not add more than 5 percent total harmonic voltage distortion to the normal bus, nor more than 10 percent while operating from the standby generator in accordance with IEEE 519, 1992.
 - c. Maximum total and individual harmonic current distortion limits for each odd harmonic shall not exceed those set forth by IEEE 519, 1992.
 - d. If harmonic filters are needed to meet these requirements, then the speed controller supplier shall provide and be responsible for the design and manufacture of the filters. The need for filters shall be identified by the

Contractor in the Shop Drawings.

3. Reflected Wave/dv/dt Output Filters:
 - a. If the distance between the speed controller and the driven equipment requires cable terminators, they should be furnished by the speed controller supplier and installed by the contractor. The need for cable terminator(s) or reflected wave traps, shall be identified in the Shop Drawings.
 - b. Provide dv/dt output filters for VFDs which feed power to all existing (non inverter duty) motors. Rated for VFD carrier frequency 2KHz to 16KHz, maximum peak voltage of output waveform 1000V, maximum dv/dt of output waveform 500V/us. TCI MotorShield, or equal.
4. Input Harmonic Filters (HF):
 - a. Each VFD to be provided with internal or external harmonic filtering as necessary to meet IEEE 519. Input line reactors may be provided as the harmonic filter as long as IEEE 519 is met.
 - b. 460 vac (+8%, -10%). Suitable for use on any three phase, 6-pulse SCR or diode rectified loads. Suitable for use with either a single load or multiple non-linear loads.
 - c. 3-phase, 3-wire, any phase sequence. 60 Hz (+/-5%).
 - d. Passive, series connected, low pass filter network consisting of inductors and capacitors plus damping resistors to prevent the possibility of filter excitation and resonance. (Insulated-gate bipolar transistor (IGBT) based active filters or Harmonic traps shall not be used.)
 - e. Filter out the characteristic low frequency harmonics generated by a 3-phase, 6-pulse rectifier load including the 5th, 7th, 11th, 13th, 17th, 19th, 23rd, 25th, etc. Suppress 3-phase characteristic harmonics without tuning the filter or adjusting capacitors, inductors or other components. The filter shall suppress characteristic harmonics to guaranteed levels provided that the power supply line voltage unbalance is between 0% and 1%. If the voltage unbalance is between 1% and 3%, per ANSI C84.1-1995, the total input harmonic distortion (THID) at any reduced load condition shall not exceed the full load THID by more than 50% (i.e.: if 5% THID at full load, then 7.5% THID at reduced load when voltage unbalance is >1%).
 - f. Accomplish harmonic attenuation without phase shifting loads against other harmonic sources. Suitable for use with one or more 6-pulse drives, whether the rectifier consists of diodes or silicon-controlled rectifiers (SCRs) and whether or not the drives have internal inductance such as line reactors or dc link chokes.
 - g. Guaranteed harmonic distortion levels for all operating conditions from 0% load to 100% load. For three phase, 6-pulse VFD system the full load input current harmonic distortion shall be limited to 8% THID. True power factor - 0.98 lagging to 0.98 leading at the filter full load operating conditions and 0.95 leading at 80% load.
 - h. The harmonic filter shall not cause resonance with the power system. The harmonic filter shall not attract harmonics from other loads which are connected upstream of the filter. No adverse system interaction problems such as, System resonance, Overloading of filter by upstream harmonics, Overloading of filter due to the addition of non-linear loads elsewhere on the system (upstream of the filter).
 - i. The filter shall not cause the DC bus voltage (of a voltage source inverter) to increase by more than 5% when operated from nominal supply voltage. Use of the filter shall result in VFD input current waveform that is consistent with

the input current waveform of a drive using a line reactor of 3% minimum impedance.

- j. Provide capacitor contactor to remove the capacitor bank when the Generator is powering the Lift Station.
- k. All internal filter wiring shall be copper. Inductive component insulation systems: Class H (200° C). Ambient temperature: -40° C to +50° C (panel mounted construction).
- l. Temperature rise: 115° C.
- m. Full load efficiency: 98% minimum.
- n. Manufactured in the supplier's own manufacturing facility. Filters shall be fully tested prior to shipment.
- o. Manufacture shall be MTE Corporation – Matrix Adaptive Passive (AP) Filter, Or Approved TCI Equal.

C. ADJUSTABLE FREQUENCY DRIVE

- 1. Environmental
 - a. Altitude: 3,300 feet without derating.
 - b. Humidity: 5 to 95 percent, non-condensing.
 - c. Temperature: 32 to 122 degrees Fahrenheit.
- 2. Electrical
 - a. Input voltage tolerance: 10 percent of rated voltage.
 - b. Rated voltage: as shown on drawings and scheduled.
 - c. Input frequency: 48 to 62 Hertz.
 - d. Displacement power factor: 0.95, provide inductor on units 5 hp and smaller.
 - e. Efficiency at rated current and nominal voltage: 97.5 percent.
 - f. Maximum short circuit current: 5000 A rms at 600 volts.
- 3. Control
 - a. Method: Sine coded PWM with programmable carrier frequency.
 - b. Output voltage: 0 to rated voltage.
 - c. Output frequency: 0 to 400 Hz.
 - d. Volts per Hertz ratio: fully programmable.
 - e. Frequency regulation:
 - i. Analog input: 0.4 percent of maximum.
 - ii. Digital input: 0.01 percent of maximum.
 - f. DC Boost:
 - i. Fan mode: two selectable.
 - ii. Auto mode: eight selectable with independent.
 - iii. Fixed mode: selectable with independent acceleration and run boosts.
 - g. Acceleration/deceleration: two independently programmable times, adjustable from 0 to 600 seconds in 0.1 second increments.
 - h. Intermittent overload capability:
 - i. Constant torque: 150 percent of output for one minute.
 - ii. Variable torque: 115 percent of output for one minute.
 - i. Proactive current limit:
 - i. Constant torque: 20 to 160 percent of rated output.
 - ii. Variable torque: 20 to 115 percent of rated output.
 - iii. Inverse time overload: Class 20 protection with speed sensitive response, adjustable from 20 to 115 percent of rated current in 3 speed ranges.
- 4. Protective features.
 - a. Detection and trip:

- i. Undervoltage.
 - ii. Overvoltage.
 - iii. Overcurrent.
 - iv. Overtemperature.
 - v. External signal.
 - vi. Output short circuit.
 - vii. Ground fault.
 - b. Overcurrent stall.
 - c. Overvoltage stall.
 - d. Six alarms.
- 5. Signal interface:
 - a. Drive fault contact.
 - b. Drive run contact.
 - c. Drive alarm contact.
 - d. Programmable output contact.
 - e. Potentiometer input.
 - f. 0-10 VDC analog input.
 - g. 4-20 mA analog input.
 - h. 4-20 mA signal loss response.
 - i. Analog output, selectable.
 - j. Analog input conversion.
 - k. Pulse train input.
 - l. Encoder feedback closed loop speed control.
- 6. Programmable Parameters:
 - a. Dual acceleration/deceleration profiles.
 - b. Three skip frequencies.
 - c. DC injection braking.
 - d. Dynamic braking.
 - e. Slip compensation.
 - f. Negative slip compensation.
 - g. Selectable fault reset tries and time.
 - h. Electronic thermal overload.
 - i. S-curve acceleration/deceleration profile.
 - j. Standard and custom volts-per-hertz curves.
 - k. Traverse function.
 - l. Proactive current limit.
 - m. Four event fault memory.
 - n. Flying start.
 - o. Automatic DC boost.
 - p. Seven preset speeds.
 - q. Phase lock loop.
- 7. Human Interface Module- Keypad
 - a. Display faults in English language:
 - i. Power fault.
 - ii. Control fault.
 - iii. Logic fault.
 - iv. Software fault.
 - v. Protective fault.
 - b. Settings and indication
 - i. Adjustable Speed/Constant Speed Selection (systems with bypass)
 - ii. Bypass Run Indication (systems with bypass)
 - iii. Manual/Automatic Selection

- iv. Manual Pushbutton Start/Stop
- v. Speed Indication
- vi. Speed Setpoint Indication
- vii. Inverter Failure Indication
- viii. Inverter Run Indication
- ix. Manual Speed Control
- x. Alarm/Cutout Reset Switch
- xi. Output Current Indication (each phase)
- xii. Output Voltage Indication (each phase)
- xiii. Output Frequency Indication (each phase)
- xiv. Output Kilowatts Indication (each phase)
- xv. Drive Temperature Indication
- xvi. Motor RPM Indication
- c. Allow control of speed controller with start-stop function keys and digital speed potentiometers.
- d. Allow programming of all programmable parameters.
- e. Door mounted on front of enclosure.
- 8. Constant or variable torque. Coordinate with the specification of the driven equipment.

D. OVERCURRENT PROTECTION

- 1. Provide thermal magnetic main circuit breaker of scheduled ampacity.
- 2. UL short circuit withstand rating shall be 42,000A minimum.
- 3. Provide a through-the-door circuit breaker operator, which is interlocked with the door mechanism and is lockable in the off position. Provide an interlock defeat mechanism which allows authorized personnel to enter the enclosure while circuit breaker is in the on position.

E. PILOT CONTROL DEVICES

- 1. Provide the following front of panel mounted pilot devices:
 - a. Human interface Module.
- 2. Provide the following signals, prewired field connections to terminal block for SCADA interface:
 - a. Remote START input.
 - b. Remote TRIP input.
 - c. Controller ON output.
 - d. Controller in REMOTE control output.
 - e. Controller FAILED output.
 - f. Remote 4-20 mA speed demand input.
 - g. 4-20 mA speed indication output.
 - h. Motor shutdown protection (from auxiliary contact of disconnect switch local to motor).

F. ADDITIONAL REQUIREMENTS

- 1. The ASCs shall have an efficiency that exceeds 97% at 100% speed and load. The efficiency shall exceed 80% at 50% speed and load.
- 2. The ASCs shall maintain the line side displacement power factor no less than 0.95 regardless of speed and load.
- 3. The ASCs shall have a one-minute overload current rating of 110% for Variable Torque Drives.
- 4. The ASCs shall have a one-minute overload current rating of 150% for Constant Torque Drives.

5. The ASCs shall be able to start into a spinning motor. Each ASC shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the AFD shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the setpoint speed.
 6. The ASCs shall have fully adjustable acceleration and deceleration controls.
 7. The ASCs shall provide automatic phase rebalance to rebalance 3 phase load currents upset by voltage unbalance.
- G. ENCLOSURE
1. NEMA 1 or NEMA 12 if in electrical room.
 2. NEMA 4X if in corrosive area.

PART 3. EXECUTION

- A. INSTALLATION
1. Installation by Others in accordance with written instructions from manufacturer in location shown on drawings.
 2. Protect panels while construction is underway.
 3. Clean panels and touch up paint when construction is complete.
 4. Adjust overload devices.
 5. Adjust all programmable controller features, including but not limited to auto restart parameters. The controller system must automatically restart after a power fail condition.
 6. Provide engraved nameplates. Use equipment tag names shown on the plans.
 7. Provide typed label inside each unit identifying motors served, nameplate horsepower, full load current, code letter, service factor, voltage/phase rating, and overload setting.
 8. Provide typed label inside each unit identifying configured valves for all programmable drive parameters.
- B. QUALITY CONTROL AND TESTING
1. Inspect and test each unit in accordance with NEMA ICS. 2, Division 16, and Vendor Manuals.
 2. Prior to each drive application startup, all equipment shall be inspected for proper alignment and proper connection.
 3. Short commercial tests shall be made, including no-load current at rated voltage, full load current, and locked rotor current.
 4. Provide test of motor cables prior to energizing each new ASC. ASC manufacturer to provide test procedure.
 5. Provide a pre-service test operation of the drive and motor in all normal modes of operation to test start, stop, jog, run, acceleration, and deceleration in local and remote modes.
 6. Provide certified copies of test reports on each drive, to the Engineer for review.
- C. TRAINING
1. The Contractor shall provide a training session for up to 4 Owner's representatives for 2 hours with a maximum of 2 trips at a job site location determined by the Owner. Training and instruction time shall be in addition to that required for start-up services.

2. The training shall be conducted by the manufacturer's qualified representative.
3. The training program shall consist of the following:
 - a. Instructions on the proper operation of the equipment.
 - b. Instructions on the proper maintenance of the equipment.

--END OF SECTION--

SECTION 26 6620

STANDBY POWER GENERATOR

PART 1 GENERAL

A. RELATED REQUIREMENTS

1. Applicable provisions of Division 0 and Division 1 shall govern work in this Section.

B. DESCRIPTION

1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install Natural Gas powered, standby electrical power generator including outdoor enclosure and subbase fuel tank or connection to Natural Gas by utility provider.
2. System to be designed for outdoor operation and maintenance in outdoor environment with temperatures between -20 and 120 Degrees F.
3. Standby power generator to be designed to accept full rated load in a single load step in accordance with NFPA 110 for level 1 systems.

C. QUALITY ASSURANCE

1. Equipment and installation shall conform to the requirements of the following agencies:
 - a. U.S. Environmental Protection Agency (EPA): Design Criteria of Mechanical, Electrical, and Fluid System and Component Reliability.
 - b. National Fire Protection Association (NFPA)
 - c. NFPA-70 - National Electrical Code (NEC), and Wisconsin amendments thereto.
 - d. NFPA - 76A Essential Electrical Systems for Health Care Facilities.
 - e. NFPA-101 Life Safety Code.
 - f. Underwriter's Laboratories (UL). Electrical Construction Material List.
 - g. Local Codes and Ordinances
 - h. American National Standards Institute ANSI Y32.2.
 - i. Institute of Electronic and Electrical Engineers (IEEE).
 - j. National Electrical Manufacturers Association (NEMA).
2. The following production tests shall be completed on the engine/generator assembly.
 - a. Mechanical operation test.
 - b. Ground tests.
 - c. Control wiring tests.
 - d. Operation test.
3. Engine/generator set shall be product of a manufacturer who shall warranty complete engine/generator package with accessories as described herein.

D. WARRANTY

1. 10 Year Major Components Warranty.
2. 5 Year Factory Warranty on entire system.
3. Warranty period to start at time of Startup/Commissioning.

E. SUBMITTALS

1. Shop Drawings: Submit under provisions of Division 1, including the following:

- a. Manufacturer's cut sheets of all system equipment. Information included on cut sheets shall be sufficient to determine compliance with these specifications.
 - 1) Dimensional drawings of all system equipment. As a minimum, drawings shall show all critical dimensions and shall show all field connection points. Drawings shall be project-specific. Accessories not being offered for this project shall not be shown on the drawings furnished.
 - 2) Generator room section at a minimum scale of $1/2" = 1'-0"$. Section line shall be parallel to the long axis of the generator. As a minimum, drawing shall show overall height of installation, muffler and exhaust support details, and exhaust pipe coordination with radiator exhaust duct.
 - 3) Fuel piping isometric with pipe sizes, pipe materials, valves, and calculations shown.
- b. Single line diagram in accordance with ANSI Y32.2 indicating connections and controls.
- c. Electrical schematics showing all connection termination points for SCADA interfaces, ATS connections, power supply connections, battery charger connections, block heater connections, generator connections, engine controls connections, tank level connections, etc.
- 2. Submit test reports including:
 - a. Certified test reports of prototype, production, and field tests.
 - b. Submit to the owner, manufacturer's instructions for start-up, performing cleaning, operating, and maintaining standby power systems.
- 3. Submit operation and maintenance manuals under provisions of Section 01730.
- 4. Submit certificates of proper installation and operator training (by manufacturer's representative).

F. OPERATIONS AND MAINTENANCE MANUALS

- 1. Operations and Maintenance Manuals shall be reviewed by the engineer for completeness at completion of project.
- 2. Four copies of Operations and Manuals shall be provided and shall include but not be limited to the following:
 - a. Recommended spare parts list.
 - b. Warranty Documents
 - c. Installation Instruction Manuals.
 - d. Operation Instruction Manuals.
 - e. Startup Instruction Manuals.
 - f. Programming Setup Instruction Manuals.
 - g. Repair and Preventative Maintenance Manuals.
- 3. Operations and Maintenance Manuals shall include all shop drawing data.

PART 2 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Caterpillar.
2. Cummins
3. Kohler
4. Other as Approved by Engineer

B. ENGINE/GENERATOR RATINGS

1. Generator. The generator shall be three phase, four wire, 240/480 Vac, 60 hertz, single bearing synchronous type with brushless exciter and shall be built to latest NEMA, IEEE, and ANSI standards. Class F insulation shall be used on the stator and rotor. Generator shall be drip proof with windings encapsulated in water proof sealant. Cooling shall be direct drive centrifugal blower. A generator mounted voltage regulator shall be provided to match the characteristics of the generator and engine. The solid-state regulator module shall be shock mounted for protection against vibration. Voltage regulation shall be $\pm 2\%$, no load to full load, a rheostat shall provide $\pm 5\%$ adjustment.
2. The generator shall be rated for operation at the rated KW and KVA outputs specified herein. It shall be brushless type, revolving field rigidly coupled to the engine, permanently aligned. The generator set shall be capable of furnishing full kW output at 80% pf. at the nameplate rating.
3. Minimum generator requirements at 1800 rpm are as follows:
 - a. Minimum Standby KW Rating 40 KW
 - b. Minimum Standby KVA Rating 50 KVA
 - c. Minimum Motor Starting KVA 150 KVA
4. Voltage drop as measured on an oscilloscope for the above motor starting loads when averaged over any 5 cycles shall not drop by more than 35% for more than 30 cycles. Within 180 cycles voltage shall have recovered to within 85% of normal.
5. The specified kW rating shall be for continuous electrical service during interruption of the normal utility sources. These ratings must be substantiated by manufacturer's standard published curves. Special rating or maximum ratings are not acceptable. The successful supplier will be required to furnish calculations and test data for approval to verify proper operation of the proposed equipment under the load conditions proposed.

C. ENGINE CONSTRUCTION AND RATINGS

1. Engine speed of 1,800 rpm.
2. Water cooled with plant mounted radiator.
3. Heavy duty industrial type.
4. 24Vdc positive engagement, solenoid shift, starting motor.

D. ENGINE ACCESSORY EQUIPMENT

1. Governor to maintain frequency regulation not to exceed 5% (3 Hz) from no load to full rated load. Governor control system shall be compatible with and be capable of regulating engine speed to permit starting of and simultaneous running of connected loads as shown on drawings.
2. Lubrication break-in oil.
3. Electric fuel solenoid shut-off valve with standard fuel filter on engine.
4. Oil drain extension through side of skid base.
5. Heavy duty air cleaner.

6. Lube oil filter with replaceable elements.
 7. Overspeed cut-out.
 8. Low oil pressure cut-out.
 9. High coolant temperature cut-out.
 10. Flexible fuel connections.
 11. Seamless, flanged stainless steel, flexible exhaust connection.
 12. Engine coolant heater, coordinate 120V single or 208/240V 3 phase in main control panel, with adjustable thermostat.
 13. Welded steel skid type base securely mounted with anchored mounting bolts and with integral spring vibration isolators. The proper quantity and size of spring isolators shall be provided to assure that the isolators are not totally compressed during operation.
- E. ENGINE COOLING EQUIPMENT
1. Unit Mounted Radiator
 2. Pusher type fan.
 3. Duct flange.
 4. Sized for 50% ethylene-glycol solution at 40°C. ambient and 1,000 ft elevation.
 5. Ethylene-glycol antifreeze with rust inhibitor to -40°C.
- F. GENERATOR CONSTRUCTION
1. 3-ph, 60 Hz, 240/480 Vac, 4 wire
 2. Single bearing.
 3. Synchronous type.
 4. 12 lead reconnectable.
 5. Drip-proof construction.
 6. Radio suppression.
 7. Class H Insulated.
 8. Brushless, direct-connected type exciter with shaft mounted diodes and built-in permanent magnets to eliminate field flashing.
 9. SCR type automatic voltage regulator to provide $\pm 2\%$ voltage regulation from no load to full load.
 10. Application of one-step load of 50% of rated load shall not result in voltage dip of more than 15% with recovery to within $\pm \frac{1}{2}$ of 1% in less than 2 sec.
 11. Regulator shall be filtered to eliminate the effect of SCR loads on the regulator.
- G. ENGINE/GENERATOR CONTROLLER
1. NEMA Type 1 enclosure, vibration isolated on generator enclosure.
 2. Plug-in design circuitry for quick replacement.
 3. Fused DC circuits.
 4. Complete 2-wire start/stop control to operate on activation of remote contact from automatic transfer switch.
 5. Design starting system for restarting in event of false engine start by permitting engine to completely stop and then re-engage starter.
 6. Overcranking protection designed to open cranking circuit after 60-sec (adjustable) if engine fails to start.
 7. Circuitry to shut down engine when signals for high coolant temperature, low oil pressure, overcrank or overspeed are received, with reset button.
 8. Adjustable (5-minute minimum) time delay on engine shutdown after retransfer to normal to allow unloaded running cool down.

9. Three position automatic/off/test selector switch.
10. Emergency stop switch.
11. Indication Lights to signal:
 - a. Overcrank - red.
 - b. High coolant temperature - red.
 - c. Overspeed - red.
 - d. Low oil pressure - red.
 - e. Selector switch OFF - Red (flashing).
12. Test button for indicating lights.
13. Voltmeter.
14. Ammeter.
15. Voltmeter-ammeter phase selector switch.
16. Direct reading pointer type frequency meter.
17. Panel illumination lights with on/off switch.
18. Battery charging ammeter.
19. Oil pressure gauge.
20. Coolant temperature gauge.
21. Running time meter.
22. Plug-in voltage regulator with voltage adjusting rheostat.
23. Unpowered normally open Generator failure signal to remote location.
24. Unpowered normally open Generator run signal to remote location.
25. Line circuit breaker or line sensing field circuit breaker, molded case, resettable- type, 3-pole, 600V (may be 800V), in NEMA 1 enclosure, unit mounted. Circuit breaker shall be UL or CSA listed for use as service equipment.

H. STARTING BATTERIES

1. 2-12 v dc.
2. Ampere-hour rating as required by factory
3. Lead antimony type.
4. Full warranty for two years (no pro-rating)
5. Stranded copper battery cables.
6. Free standing metal rack with acid resistant paint.

I. AUTOMATIC BATTERY CHARGER

1. Automatic battery charger shall have a transistor controlled magnetic amplifier circuit to provide continuous taper charging.
2. Maintain constant voltage output with ac line fluctuations of $\pm 10\%$.
3. Two ranges, float at 2.17 v dc and equalize at 2.33 v dc.
4. Automatic ac line compensation.
5. Automatic overload protection current limiting.
6. Silicone diode full-wave rectifiers.
7. Automatic surge suppressors.
8. DC ammeter and voltmeter.
9. Fused 110Vac input and DC output.
10. 6-amp DC output minimum, size to carry DC continuous load current and simultaneously recharge the battery within 4-hrs.
11. NEMA 1 enclosure for wall mounting.

J. EXHAUST EQUIPMENT

1. Provide Residential Grade exhaust silencer.
 2. Provide with drain plug at bottom of muffler opposite of exhaust outlet.
 3. Exhaust Piping. Stainless steel with condensate drip pocket and drain valve.
 4. Insulate in accordance with Division 15 specifications.
 5. Provide aluminum cover over insulation.
- K. OUTDOOR ENCLOSURE
1. Provides weather protection for entire standby generator system.
 2. Enclosed Engine Silencers
 3. Includes subbase fuel tank, depending on engine drive method.
 4. Lockable flush mounted doors with stainless steel latches.
 5. Air inlet louvers and dampers to reduce rain and snow entry.
 6. Multi-service access doors for easy access to fuel fill port, generator set controls, generator breaker, oil fill, radiator fill and battery system.
 7. Interchangeable modular panel construction, with bolted panels to facilitate service or future modification upgrades.
 8. Two GFCI protected internal 120-volt service receptacles.
 9. Internal AC service light package with DC backup.
- L. OTHER REQUIRED EQUIPMENT
1. Line circuit breaker, molded case, resettable type, 3-pole, 600V or 800V, in NEMA I enclosure, unit mounted. Circuit breaker shall be UL or CSA listed for use as service equipment.
 2. Provide generator run output contact for monitoring by SCADA (for future SCADA).
 3. Provide generator fail output contact for monitoring by SCADA (for future SCADA).

PART 3 EXECUTION

- A. INSPECTION
1. Examine area to receive engine/generator to assure adequate clearance for engine/generator installation.
 2. Examine room air intake and exhaust to assure adequate air requirements
 3. Verify that mounting area is level and free of irregularities.
 4. Coordinate conduit stub up locations with concrete contractor. All conduit locations are the responsibility of the contractor.
 5. Start work only after unsatisfactory conditions are corrected.
- B. INSTALLATION
1. Install engine/generator in accordance with manufacturer's written instructions and NEC.
 2. Lubrication and break-in oil to be supplied and installed by supplier's or manufacturer's technician at time of start-up.
 3. Anti-freeze with rust inhibitor (set to -40°C.) to be supplied and installed by supplier's or manufacturer's technician at time of startup.
- C. FIELD TESTS PRIOR TO START UP
1. Megger check of phase-to-phase and phase-to-ground insulation levels. Do not megger check solid state equipment.
 2. Ground continuity.

3. Short circuit.
 4. Perform additional tests according to engine/generator manufacturer's instruction.
- D. CLEANING
1. Clean equipment and equipment room floor prior to start- up.
 2. Touch up scratches or marred surfaces to match original finish.
- E. SUPPLIER'S OR MANUFACTURER'S SERVICES
1. Retain services of engine/generator set manufacturer's factory trained technician employed by engine/generator set manufacturer or his authorized distributor to perform following services:
 - a. Visit project site to review installation requirements with Contractors involved. Visit shall be made prior to permanently installing equipment and/or making mechanical or electrical connections.
 - b. Visit site and meet with all Contractors to ensure installation is properly coordinated. Electrical Contractor to coordinate meeting to ensure presence of all parties concerned.
 - c. Testing Services.
 - d. In addition to normal factory tests, provide a 3-phase portable load bank at project site. Load bank test shall occur after equipment has been permanently installed and shall be performed in the presence of Engineer:
 - e. Connect engine/generator set to the load bank and conduct a 2-hr test
 - f. During two-hour test, vary load on generator from 10% to 100% to determine that voltage, frequency, capacity, fuel, combustion air, cooling, and ventilation systems are adequate. Step load during test as follows.
 - 1) 10% load for 15 min.
 - 2) 25% load for 15 min.
 - 3) 50% load for 15 min.
 - 4) 75% load for 15 min.
 - 5) 100% load for 1 hr.
 - g. Apply each increment of load in one step.
 - h. During the test the following performance criteria shall be met.
 - i. Maximum voltage dip of 20%.
 - j. Recovery of less than 2 sec to maintain voltage and frequency as specified.
 - k. Submit release signed by supplier and Contractor to Owner and Engineer with deficiencies noted, if any, along with proposed solutions.
 - l. Include a minimum of six simulated power failures in the presence of transfer switch manufacturer's start-up representative.
 - m. Test remotely connected engine/generator status indication signals.
 - n. Test transfer switch.
 - o. Instructional Services. Provide a comprehensive demonstration to Owner or maintenance personnel and Engineer of system maintenance and operation after load bank test and after engine/generator set is electrically connected to automatic transfer switch.
- F. PRODUCT DELIVERY, STORAGE, AND HANDLING
1. Lift engine/generator using eyes, yokes and skids provided by manufacturer.
 2. Protect from work of other trades and weather.

--END OF SECTION--

SECTION 26 6621

AUTOMATIC TRANSFER EQUIPMENT

PART 1 GENERAL

A. RELATED REQUIREMENTS

1. Applicable requirements of Division 0 and Division 1 shall govern work in this Section.

B. DESCRIPTION

1. Provide a factory assembled, service-entrance rated, automatic transfer switch for distribution and control of power from normal power supply or from output of a standby engine/generator upon failure of normal power supply to outgoing feeder terminals and automatic retransfer back to normal power supply upon resumption of normal service.

C. QUALITY ASSURANCE

1. Equipment shall comply with the requirements of the following Regulatory Agencies:
 - a. U.S. Environmental Protection Agency (EPA). Design criteria for Mechanical, Electrical, and Fluid System and Component Reliability.
 - b. National Fire Protection Association (NFPA).
 - c. Underwriters' Laboratories, Inc. (UL).
 - d. Local Codes and Ordinances.
 - e. American National Standards Institute (ANSI).
 - f. National Electrical Manufacturers Association (NEMA). Standard ICS.
 - g. National Electrical Code (N.E.C.).
 - h. Occupational Safety and Health Administration (O.S.H.A.).
2. Perform the following production tests on the completed transfer switch:
 - a. Operation of individual components.
 - b. Correct overall sequence of operation.
 - c. Transfer time.
 - d. Voltage.
 - e. Time delay settings.
 - f. Dielectric strength test per NEMA Standard ICS 1-109.05.
3. A prototype of the switch shall have been subjected to and have passed the following tests by a certified independent testing laboratory.
 - a. Overload and endurance at 480 VAC per Table 21.2 and 23.2 of UL 1008 when enclosed per Table 1.6.
4. Provide with full rated neutral bar.
5. The switch shall have passed tests per paragraph 25 of UL 1008 to withstand current @ 480 VAC and X/R ratio of 6.6 or less using MCB upstream of the ATS.
6. The entire transfer switch and relay plate assembly should be capable of withstanding a 2500-volt crest transient per IEEE standard 472-1974. The transient voltage test shall be conducted across the normal source terminals, the emergency source terminals, and between opposite normal and emergency source terminals. A certified laboratory test report from an independent testing laboratory shall be furnished to verify conformance.

D. SUBMITTALS

1. Shop drawings shall indicate transfer switch, control panel and enclosure dimensions, control arrangements, and single line diagrams in accordance with ANSI Y 32.2 indicating connections and controls.
2. Submit manufacturer's written recommendations for storage and protection, installation instructions, and field test requirements.
3. Submit manufacturer's instructions for start-up, performing cleaning, operating, and maintaining transfer switch systems.

PART 2 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Coordinate with utility provider.

B. TRANSFER SWITCH RATINGS

1. Service-entrance rated.
2. 400 amp (min), 240/480-volt, 3 phase, 4 wire.
3. Minimum Short Circuit Rating: 42,000 rms sym amps minimum and as required by Electrical Studies.
4. NEMA 4x exterior enclosure, pad-lockable.

C. EQUIPMENT SWITCH CONSTRUCTION

1. Transfer switch is to be mechanically held, electrically operated by a single solenoid or motor mechanism momentarily energized from the source to which the load is being transferred.
2. The switch shall be rated for continuous duty and shall be inherently double throw, mechanically interlocked to ensure only one of two possible positions, normal or emergency.
3. Load carrying parts shall have full 600-volt minimum insulation and main contacts, as well as arcing contacts and shall be replaceable without disassembly of the operating mechanism or disconnection of power conductors.
4. The transfer switch shall consist of a power transfer module and a control module separately mounted. Control module shall be mounted on the inside surface of the enclosure door to facilitate safe adjustment and service. Harnessing between transfer module and control module shall have built-in disconnect.
5. The automatic transfer switch shall be suitable for use in emergency systems, listed by Underwriter's Laboratories under Standard 1008 for total system transfer.
6. The transfer switch shall be capable of switching all classes of load and shall be rated for continuous duty when installed in a non-ventilated enclosure constructed in accordance with Underwriters' Laboratories, Inc. Standard UL-508.
7. The transfer switch shall be double throw, actuated by a single electrical operator momentarily energized and connected to the transfer mechanism by a simple over center type linkage with a total transfer time not to exceed ½ second. The transfer switches shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals.
8. The normal and emergency contact shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contact shall be mechanically locked

in position in both the normal and emergency positions without use of hooks, latches, magnets, or springs; and shall be silver tungsten alloy protected by arcing contacts with magnetic blowouts on each pole. Interlocked molded case circuit breakers or contactors are not acceptable.

9. The transfer switches shall be equipped with a manual operator per paragraph 14 of UL standard 1008 that is designed to prevent injury to the operating personnel if the electrical operator should suddenly become energized during manual transfer. The manual operator shall provide the same contact-to-contact transfer speed as the electric operator to prevent a flashover from switching the main contacts slowly. The manual operator shall be designed to operate without opening the enclosure door. The switch assembly shall be designed such that manual operation will not put the person standing in front of it at risk of Arc Flash. A mechanical visual indicator for the switch position shall be provided.
10. All relay, timers, control wiring and accessories shall be front accessible. Test switch and pilot lights shall be on front of cabinet door. The voltage sensing relays and all adjustable times shall be capable of being adjusted while energized, through calibrated dials. All control wire terminals shall be ring or locking spade terminals.
11. All wiring shall be identified by tubular sleeve-type markers.
12. **ARC FLASH WARNING LABELS**
 - a. All transfer switches shall include a warning label indicating the risk of arc flash. The warning label shall comply with N.E.C. article 110.16 and O.S.H.A. 29.

D. ACCESSORIES

1. The control panel shall meet or exceed the voltage surge withstand capacity in accordance with IEEE Std. 472-1974 and impulse voltage withstand test in accordance with NEMA Std. ICS 1-109 and shall be supplied with the following accessories:
 - a. Engine starting contacts, gold plated for low voltage DC service. Contacts to close on failure of normal source to initiate engine starting.
 - b. Auxiliary contact to open when normal fails.
 - c. Independent voltage and frequency sensing network to prevent transfer to emergency until generator voltage is 90% of nominal and generator frequency is 95% of nominal.
 - d. Time delay on engine starting .5 to 3 second adjustable time delay to ignore momentary outages, factory set at 3 seconds.
 - e. Adjustable time delay on retransfer to normal (motor driven type - 0 to 30 minutes) fixed 5-minute unloaded running time for cool-down of stand-by plant after retransfer to normal.
 - f. Solid State Close Differential Relay protection on normal. Three Close Differential Sensing Relays factory set for 90% pickup, 80% dropout. Relays are adjustable in the field.
 - g. Test switch momentary type to be mounted on cabinet. Provides for testing operation of emergency plant and transfer switch (simulates normal power failure).
 - h. Green Pilot Light for indicating switch in normal position.
 - i. Red Pilot Light for indicating switch in emergency position.
 - j. Auxiliary Contact on main shaft (closed on normal) for monitoring by SCADA.
 - k. Auxiliary Contact on main shaft (closed on emergency) for monitoring by SCADA.

1. Assembly shall include an in-phase monitor/controller. The controller shall be bi-directional, operating independent of line voltage to assure transfer between live sources in either direction within a 20-degree phase angle difference (to protect system from abnormal motor inrush currents).

PART 3 EXECUTION

A. INSPECTION

1. Examine area to receive transfer switch to assure adequate clearance for transfer switch installation.
2. Start work only after unsatisfactory conditions are corrected.

B. INSTALLATION

1. Install transfer switch in accordance with manufacturer's written instructions and NEC.
2. Contractor shall provide control wiring as required between transfer switch starting contacts and generator. Starting contacts for multiple transfer switches served from the same generator shall be wired in parallel. Control wiring shall be in conduit.

C. FIELD QUALITY CONTROL

1. Field Test Prior to Start-up.
2. Megger check of phase-to-phase and phase-to-ground insulation levels.
3. Continuity.
4. Do not megger check solid state equipment.
5. Perform tests according to transfer switch manufacturer's instructions.

D. ADJUSTMENTS AND CLEANING

1. Check adjustment of mechanism for free mechanical movement.
2. Tighten connections and mechanical fasteners.
3. Touch up scratched or marred surfaces to match original finish.

E. TRANSFER SWITCH START-UP

1. Retain services of transfer switch manufacturer's factory trained technician to perform following services:
2. After engine/generator load bank test and after engine/generator set is electrically connected to automatic transfer switch, provide comprehensive demonstration of system maintenance and operation to OWNER or OWNER'S maintenance personnel.
3. Include minimum of six simulated power failures.

F. PRODUCT DELIVERY, STORAGE AND HANDLING

1. Do not store indoor type equipment exposed to weather.
2. Protect system equipment from work of other trades.

--END OF SECTION--

SECTION 31 2200

SITE EXCAVATION AND EARTHWORK

PART 1. GENERAL

A. WORK INCLUDED

1. Clearing of debris, grass, tree roots and other items in preparation for construction.
2. Protection of existing structures, trees or vegetation to remain.
3. Stripping of topsoil from areas to be incorporated into the work.
4. Excavation, filling and compaction for grading and paved surface subgrade preparation.

B. REFERENCES

1. ASTM D1557, D2487, D2922, D3017

PART 2. PRODUCTS

A. MATERIALS

1. Common Fill: Onsite or offsite natural soil free from organic matter, debris, vegetation, stones larger than 6" and frozen material and classified in ASTM D2487 as follows:
 - a. 1. GW: Well graded gravels, gravel-sand mixtures, little or no fines
 - b. 2. GP: Silty gravels, gravel-sand-silt mixtures
 - c. 3. GM: Silty gravels, gravel-sand-silt mixtures
 - d. 4. GC: Clayey gravels, gravel-sand-clay mixtures
 - e. 5. SW: Well graded sands, gravelly sands, little or no fines
 - f. 6. SM: Silty sands, sand-silt mixtures
 - g. 7. SC: Clayey sands, sand-clay mixtures
 - h. 8. ML: Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
 - i. 9. CL: Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
2. B. Breaker Run: Crushed stone meeting the following gradation:

a. 5-inch Breaker Run:

B	Sieve Size	B	% Passing by Weight
B	5 inch	B	90 – 100
B	1 ½ inch	B	20 – 50
B	No. 10	B	0 – 10

b. 3-inch Breaker Run:

Sieve Size	% Passing by Weight
3 inch	90 – 100
1 ½ inch	60 - 85
¾ inch	40 - 65
No. 4	15 – 40
No. 10	10 – 30

No. 40	5 – 20
No. 200	2 – 12

3. C. Select Granular Backfill: Durable particles ranging from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids of the coarse material. Some fine clay or loam particles are desirable, but they shall not be present in the form of lumps. Granular backfill shall conform to the following gradation:

Sieve Size	% Passing by Weight
3 inch	100
2 inch	95 – 100
No. 4	35 – 60
< No. 200	5 – 15

PART 3. EXECUTION

- A. PROTECTION
1. Locate and identify existing utilities that are to remain and protect them from damage.
 2. Protect trees, plants, structures, beds, site improvements and features designated to remain.
 3. Protect bench marks, property corners, and other survey monuments from damage or displacement.
- B. GRUBBING
1. Remove all stumps, main root balls and root systems to 12” minimum below subgrade.
- C. TOPSOIL EXCAVATION
1. Topsoil stripped from the site is to be stockpiled on-site and not transported.
- D. UTILITY TRENCH EXCAVATION
1. Cut trenches wide enough to enable installation of the utilities and allow inspection. Normal trench width below the top of the pipe shall be the nominal pipe diameter plus 24 inches. Trench sidewalls shall not be undercut.
 2. Trench walls more than five feet in depth shall be shored, cut back to stable slope or provided with equivalent means of protections in accordance with the applicable rules of the Department of Labor, Occupational Safety and Health Administration (OSHA). Provide a ladder for trench exiting in trenches over 4 feet in depth.
 3. Excess excavation below the required grade level shall be backfilled with crushed stone at no additional cost to the Owner.
 4. Extra trench depth excavation to provide a stable trench shall be done at no additional cost to the Owner.
 5. Remove bedrock, boulders or stones revealed in the trench within 6” of the pipe and the rock feature.
 6. Do not excavate more than 100 feet of trench length ahead of or behind the pipe work.
 7. Disposition of excess utility trench material is the responsibility of the Contractor. Material may be utilized for backfill material (not bedding or pipe cover material).
 8. Backfill trenches with select granular backfill meeting the requirements of Section B of this Specification. Based on prior experience in this area, the Contractor may utilize

excavated trench materials (suitable material with no boulders, rocks or rubble) for trench backfill.

9. Material layer thickness shall not exceed 8" compacted thickness, to the maximum dry density of 90-95% in accordance with ASTM D1557.
10. The Contractor is responsible to maintain optimal moisture content to provide the maximum dry density.

E. TESTING

1. The Contractor is responsible for meeting all compaction requirements. This includes the use of an independent testing firm, at no additional cost to the Owner, to perform compaction testing/sampling to confirm the in-place density if ordered by the Engineer where compaction non-compliance persists.
2. Determination of moisture content shall be according to ASTM D3017. Determination of density shall be in accordance with ASTM D2922.

--END OF SECTION--

SECTION 31 2319

DEWATERING

PART 1. GENERAL

A. SCOPE

1. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide for dewatering as required in these specifications, on the drawings and as otherwise deemed necessary to complete the work. All dewatering required for construction shall be included in the Contractor's Bid.

B. REFERENCES

1. Chapter NR 141 – Groundwater Monitoring Well Requirements
2. Chapter NR 812 – Well Construction and Pump Installation

C. SUBMITTALS

1. When deep wells or well point systems are utilized, provide system design computations.
2. When permits are required for dewatering, provide copies of all permits.
3. Provide copies of the layout of all dewatering system components.
4. Provide copies of all well abandonment forms.

D. PERMITS/FEEES

1. Pay for and obtain all permits/approval required by local, state and federal regulations.
2. Necessary permits/approval may include, but are not limited to WDNR high capacity well approval and erosion control permits.
3. When installing by jetting methods, the Contractor shall provide their own water source. Do not use hydrants as water source without permission from the Engineer and/or local utility, as applicable. If permission to use hydrants has been allowed, the Contractor shall obtain and pay for any required hydrant use permits.

E. ENVIRONMENTAL CONTAMINANTS

1. Monitor dewatering system discharge regularly for signs of chemicals or other environmental contaminants.
2. If chemicals or environmental contaminants are observed, terminate dewatering system operation immediately and contact the Engineer.
3. Prevent dewatering system from introducing contaminants into the soil or groundwater.

F. NOISE POLLUTION

1. Provide mufflers, housing, berms and fencing as necessary to minimize noise pollution resulting from dewatering system operation.

PART 2. MATERIALS

- A. All deepwell and wellpoint dewatering equipment and well construction/abandonment materials shall meet the requirements of NR 812.

PART 3. EXECUTION

A. GENERAL

1. Comply with all local, state and federal regulations.
2. When deep wells or well point systems are utilized, prepare a system design. Design system to dewater site as necessary to complete construction, but minimize impact on local water table. Do not adversely impact neighboring private wells.
3. Coordinate installation of dewatering system with other contractors. Locate dewatering system components in locations that do not interfere with site operations or other construction activities.
4. Monitor water levels in wells adjacent to construction site. Adjust dewatering system configuration and operation as necessary if neighboring wells are adversely impacted.
5. Pump groundwater at lowest rate necessary to dewater site as required to accommodate other sitework.

B. SUMP DEWATERING

1. Install collection sump in the low point of the excavation(s). Coordinate with other adjacent properties that may be impacted by dewatering operations.
2. Provide filter material, trash screens and other devices around pump or intake to avoid pumping of sediment.
3. Provide silt screens, sediment traps or other devices necessary to reduce and/or eliminate offsite sediment transport.

C. WELL INSTALLATION

1. Install wells by rotary, driven or hydraulic jetting methods.

D. OPERATION

1. Provide personnel, equipment and power necessary to maintain and operate the dewatering system as required to complete construction at the site.
2. Do not discharge water into the sanitary sewer system.

E. REMOVAL/ABANDONMENT

1. Remove all dewatering system components immediately following use.
2. Abandon dewatering wells in accordance with NR 812.
3. Clean receiving storm sewer system, ground surface and surface waters of any sediment or debris deposits resulting from dewatering system operation.

--END OF SECTION--

31 2513 CONSTRUCTION SITE EROSION CONTROL

A. GENERAL.

1. SECTION INCLUDES.
 - a. Erosion control measures at and adjacent to the project site.
 - b. Protection of waters of the state.
 - c. Construction dewatering
2. RELATED SECTIONS.
 - a. Section 32-9119, Landscape Grading & Topsoil Placement
3. SUBMITTALS.
 - a. Product Data: Submit product data for silt fence, inlet protection fabric, silt curtain, turbidity barrier, and polymer stabilizer.
 - b. Inspection Reports: Maintain a log of inspection reports for erosion and sediment controls in accordance with DNR requirements and submit all reports to the Engineering Division before final acceptance of the project.
 - c. Dewatering Procedures: Submit proposed procedures of dewatering, including anticipated pumping rates if applicable.
 - d. Permits: Submit one copy of all permits obtained for dewatering.
4. TESTING (NOT USED).
5. WARRANTIES. The work included in this section shall be warranted as specified in Section 01 0100, Road Project Description & Special Conditions.

B. MEASUREMENT & PAYMENT.

1. SILT FENCE.
 - a. Measurement: The Village will measure Silt Fence by the linear foot acceptably completed.
 - b. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Silt Fence". Payment is full compensation for furnishing, installing, maintaining, and removing silt fence.
2. EROSION BALES.
 - a. Measurement: The Village will measure Erosion Bales by the number of standard size bales acceptably completed.
 - b. Payment: Payment for measured quantities will be made at the contract unit price each for "Erosion Bales". Payment is full compensation for furnishing, installing, maintaining, and removing erosion bales.
3. INLET PROTECTION.
 - a. Measurement: The Village will measure Inlet Protection by the number of standard size inlets acceptably protected
 - b. Payment: Payment for measured quantities will be made at the contract unit price each for "Inlet Protection". Payment is full compensation for furnishing, installing, maintaining, and removing inlet protection.
4. SILT SOCK.
 - a. Measurement: The Village will measure Silt Sock by the linear foot acceptably completed.
 - b. Payment: Payment for measured quantities will be made at the contract unit price per linear foot for "Silt Sock". Payment is full compensation for furnishing, installing, maintaining, and removing silt sock.
5. CONSTRUCTION ENTRANCE.
 - a. Measurement: The Village will measure Construction Entrance by the number of construction entrances acceptably completed.
 - b. Payment: Payment for measured quantities will be made at the contract unit price each for "Construction Entrance". Payment is full compensation for furnishing, installing, maintaining, and removing construction entrances.

6. CLEAR STONE BERM (DITCH CHECK).
 - a. Measurement: The Village will measure Clear Stone Berm (Ditch Check) by the number of clear stone berm (ditch check) acceptably completed.
 - b. Payment: Payment for measured quantities will be made at the contract unit price each for "Clear Stone Berm (Ditch Check)". Payment is full compensation for furnishing, installing, and maintaining clear stone berm (ditch check).
7. POLYMER STABILIZATION.
 - a. Measurement: The Village will measure Polymer Stabilization by the square yard acceptably applied.
 - b. Payment: Payment for measured quantities will be made at the contract unit price per square yard for "Polymer Stabilization". Payment is full compensation for furnishing and applying polymer stabilizer.

C. EROSION CONTROL MATERIALS.

1. GENERAL. Products used for erosion control shall comply with:
 - a. The Wisconsin Department of Transportation (DOT) Erosion Control Product Acceptability List (PAL) available on the DOT website at:

<https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/tools/pal/default.aspx>
 - b. The Wisconsin Department of Natural Resources (DNR) Technical Standards for Construction Site Erosion Control and Sediment Control Practices are available on the DNR website at:

https://dnr.wisconsin.gov/topic/Stormwater/standards/const_standards.html.
2. SILT FENCE: Silt fence shall meet the requirements of DNR Technical Standard 1056.
3. EROSION BALES: Erosion bales shall meet the requirements of DNR Technical Standard 1055.
4. INLET PROTECTION: Inlet protection shall meet the requirements of DNR Technical Standard 1060.
5. CONSTRUCTION ENTRANCE: Construction entrance shall meet the requirements of DNR Technical Standard 1057.
6. POLYMER STABILIZER: Polymer stabilizer shall meet the requirements of DNR Technical Standard 1050.
7. SEEDING: Seeding shall meet the requirements of DNR Technical Standard 1059.
8. EROSION MAT: Non-channel erosion mat shall meet the requirements of DNR Technical Standard 1052. Channel Erosion mat shall meet the requirements of DNR Technical Standard 1053.
9. CONSTRUCTION SITE DIVERSION: Construction Site Diversion shall meet the requirements of DNR Technical Standard 1066.
10. DUST CONTROL: Dust Control shall meet the requirements of DNR Technical Standard 1086.
11. MULCHING FOR CONSTRUCTION SITES: Mulching for Construction Sites shall meet the requirements of DNR Technical Standard 1058.
12. GRADING PRACTICES: Temporary Grading Practices for Erosion Control shall meet the requirements of DNR Technical Standard 1067.
13. DEWATERING: Dewatering shall meet the requirements of DNR Technical Standard 1061.
14. SEDIMENT BASIN: Sediment Basins shall meet the requirements of DNR Technical Standard 1064.
15. SEDIMENT TRAP: Sediment Traps shall meet the requirements of DNR Technical Standard 1063.

D. EXECUTION

1. EROSION CONTROL. Erosion control measures are a part of this construction contract. The Contractor shall, as a minimum, follow:
 - a. The Wisconsin Department of Natural Resources (DNR) Technical Standards for Construction Site Erosion Control.
 - b. The Village's Standard Construction Details for erosion control.
2. All storm inlets within the project limits and those immediately downstream from the construction project shall be protected from sedimentation by the installation of inlet protections. This work shall be done as shown in the details. The inlets shall be protected during all phases of construction.
3. The downstream project limits shall be protected by ensuring that sediment cannot leave the construction site. This shall be accomplished by the placement of silt fence, erosion bales, or other erosion control best management practices (BMPs).
4. Tracking of sediment onto adjacent paved roadways shall be minimized during construction. Stone tracking pads shall be installed according to DNR Technical Standards, early in the grading process to prevent sediment from being tracked onto adjacent streets. Any sediment reaching adjacent streets shall be removed by vacuum type street sweepers (not flushing) before the end of the workday.
5. All erosion control measures in place on this contract shall be inspected within 24 hours after each rainfall event 0.5 inches or greater within a 24-hour period or daily during prolonged rainfall. Repair or replacement shall be made immediately. Sediment deposits shall be removed as required by DNR Technical Standards or manufacturer's recommendations. The Contractor shall remove any sediment deposits reaching storm sewers as a result of construction on this contract by cleaning of the sewers.
6. The Contractor shall follow any DNR approved erosion control plan issued for the construction site. The Contractor shall also fill out the DNR's Construction Site Inspection Report (Form 3400-187) or an equivalent form, at least once per week and within 24-hours after a precipitation event of 0.5 inches or greater in any continuous 24-hour period. A copy of this form is available on the DNR website at:

<https://dnr.wisconsin.gov/topic/Stormwater/construction/forms.html>.
7. Re-establish temporary or permanent vegetation on disturbed areas within the time limits allowed by applicable standards.
8. Remove all erosion control measures installed after the site has been sufficiently stabilized as determined by the Engineer.

E. PROTECTION OF WATER OF THE STATE.

Protect wetlands, streams, and drainageways and waters of the State in accordance with Sections 107.18 and 107.19 of the Wisconsin Highway Specifications, and DNR requirements.

F. CONSTRUCTION DEWATERING.

1. SURFACE DRAINAGE.
 - a. The Contractor is responsible for removing surface water entering excavations or not yet fully connected storm sewer pipe or structures by using appropriate dewatering techniques. Take steps to prevent or minimize surface water entering excavations.
 - b. Provide a geotextile bag for water being pumped from excavations at all times. The geotextile bag shall be appropriately sized according to DNR technical standards. The geotextile bag shall be approved by the Engineer.
 - c. Water may not be discharged in a manner that causes erosion or sedimentation of site or receiving channels.
 - d. If the project is not covered by a DNR construction site storm water discharge permit, the

Contractor shall contact the DNR to obtain a pit/trench dewatering permit.

2. GROUNDWATER:

- a. If groundwater is present, the Contractor is responsible for dewatering the site prior to starting excavation and for maintaining groundwater a minimum of 24- inches below the bottom of the excavation. Substantial softening or loosening of the pipe subgrade soils can be experienced in the presence of groundwater when the confining effect of overburden pressure is removed. The dewatering system shall be of a sufficient size and capacity as required to control hydrostatic pressure on the trench sides and bottom to allow material to be excavated, pipe installed and backfill placed, all in a dry condition. The use of a crushed stone working mat, may be necessary to establish a stable bearing subgrade within open cut trenches.
- b. If dewatering (dewatering wells) is necessary, the Contractor shall contact the Wisconsin DNR, Private Water Supply Section, for a permit for all wells installed or operated for which the single or aggregate capacity may be in excess of 70 gallons per minute. If discharge from the high-capacity wells is routed around or bypasses the storm water runoff control system, also obtain a pit/trench dewatering permit from DNR. Application and instructions may be found here:

<https://dnr.wisconsin.gov/topic/Wells/HighCap/Apply.html>

- c. The dewatering operation shall be maintained until backfilling and compaction procedures are completed. Water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upslope chambers, hydro-cyclones, swirl concentrators, or other appropriate controls designed and used to remove particles of 100 microns or greater for highest dewatering pumping rate. If water is demonstrated to have no particles greater than 100 microns during dewatering operations, then no control is needed before discharge.
- d. Water may not be discharged in a manner that causes erosion of site or receiving channels.
- e. Contractor shall take all appropriate measures to prevent contamination of groundwater system including well-head protection, backflow prevention, and temporary grading and surface flow limitations.

G. SCHEDULES AND CHARTS (NOT USED)

--END OF SECTION--

32 1123 CRUSHED AGGREGATE BASE COURSE

A. BACKGROUND

1. DESCRIPTION. This specification includes details necessary to provide and place crushed aggregate base course (CABC) as a foundation material for asphaltic concrete pavement or Portland cement concrete pavement.
2. REFERENCES.
 - a. ASTM C136. Sieve Analysis of Fine and Course Aggregate.
 - b. ASTM D1557. Standard Test Methods Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft³).
 - c. WisDOT. Standard Specifications for Highway and Structure Construction, Current Edition.
 - d. WisDOT. Specification 301 Base, Subbase, and Subgrade Aggregate
 - e. WisDOT. Specification 305 Dense-Graded Base.
3. SUBMITTALS.
 - a. Pre-Construction. Submit material gradation(s), per ASTM C136.
 - b. During Construction. Sampling, Testing, Proposed Material Alterations

B. MATERIALS

1. WISDOT STANDARDS. All materials provided on the project shall meet the minimum WisDOT requirements.
2. RECLAIMED ASPHALT PROVISION. Do not place reclaimed asphalt, reprocessed materials, or blended materials below virgin aggregate materials unless the contract specifies or as allowed by the engineer in writing. Material classifications shall be as per WisDOT 301.2.4.2
3. STRUCTURAL BASE.
 - a. A 1 ¼ inch structural base shall be used for all base layers if no greater specification is provided by the Engineer.
 - b. A 3-inch structural base shall be used as a lower level base layer in heavier soils and wet conditions. A 3-inch base shall not be used in the top 4 inches of base.
 - c. A ¾ inch base may be used in lieu of 1 ¼ inch base, where approved by the Engineer.
 - d. Use a 1 ¼ inch base in reclaimed asphalt areas, limit the allowable reclaimed asphalt content to 50 percent or less.
 - e. Gradation for quarry-provided structural base and shoulder materials:

Sieve Size	Percentage Passing by Weight		
	3-Inch Base	1 ¼ Inch Base	¾ Inch Base
3-Inch	90 – 100	---	---
1 ½ Inch	60 – 85	---	---
1 ¼ Inch	---	95 – 100	---
1 Inch	---	---	100
¾ Inch	40 – 65	70 – 93	95 – 100
3/8 Inch	---	42 – 80	50 – 90
No. 4	15 – 40	25 – 63	35 – 70
No 10	10 – 30	16 – 48	15 – 55
No. 40	5 – 20	8 – 28	10 – 35
No. 200	2 – 12	2 – 12 ^{(1),(3)}	5 – 15 ⁽²⁾

- (1) Limited to a maximum of 8 percent in base course placed between new and old pavement.
 - (2) 8 – 15 percent passing when base is $\geq 50\%$ crushed gravel.
 - (3) 4 – 10 percent passing when base is $\geq 50\%$ crushed gravel.
- 4. SHOULDERS. Use $\frac{3}{4}$ -inch base in the top 4 inches of unpaved portion of the shoulder. Use structural base, as provided above, for all other shoulder base layers.
 - 5. RECLAIMED ASPHALT. The contractor may use reclaimed asphalt with 100 percent passing a 1 $\frac{1}{4}$ -inch sieve as 1 $\frac{1}{4}$ " base. The engineer will assess gradation primarily by visual inspection but may require testing of questionable material.
 - 6. By-Products. The contractor may provide an aggregate with one of the following by-product materials mixed with crushed gravel, crushed concrete, or crushed stone up to the listed maximum percentage, by weight: Glass – 12%, Foundry Slag – 7%, Steel Mill Slag – 75%, Bottom Ash – 8%, Pottery Cull – 7%. Such material usage may not be utilized in the top 4" of an aggregate wearing surface.

C. EXECUTION.

- 1. PREPARATION.
 - a. Verify subgrade matches the desired grade, cross-section and elevation.
 - b. In fill areas, subgrade shall be compacted to compaction testing results at no extra cost if requested by the Engineer.
 - c. Smooth subgrade to remove ruts, abnormalities, large stones, and debris.
 - d. The Contractor is responsible to conduct any necessary testing of subgrade, including compaction testing & advance proof-rolling.
 - 1. Density shall be determined according to the provisions of ASTM D2922.
 - 2. Moisture content shall be determined according to the provisions of ASTM D3017.
 - 3. Sampling shall be completed in accordance with WisDOT 301.2.3
 - e. Subgrade Proof-roll (as applicable).
 - 1. The Work shall be prepared with a representative and uniform subgrade surface.
 - 2. A loaded tandem-axle dump truck shall be used, or equivalent with a minimum gross weight of 30 tons. Equivalent vehicles shall be approved for use by the Engineer.
 - 3. The proof-roll shall be coordinated for observation by the Owner and the Engineer.
 - 4. Soft areas, yielding areas, cracked areas or areas where rolling or wave action is observed shall be considered unsatisfactory subgrade.
 - 5. Unsatisfactory subgrade shall be remedied by undercutting, replacement with suitable structural base material, compaction and finish grading.
 - 6. Undercut sub-base shall be proof-rolled again for inspection by the Owner and Engineer for verification of structural base compliance.
 - f. Do not place base course on frost conditions of any kind.
 - g. Use vibratory compaction equipment suitable for the application and intended purpose, however, tamping rollers are not allowed.
- 2. LINES & GRADE.
 - a. Base course shall be placed accordingly to the line, grade and cross section as shown on the Drawings or as directed by the Engineer.
 - b. For rehabilitation projects where curb and gutter is present, the line and grade will be provided by construction stakes set at minimum 50 foot intervals (or increased intervals as required for bends, radii, or vertical curves).

- c. For new streets where curb and gutter is not proposed, grade stakes can be provided at the Contractor's request at a minimum distance of 50 feet along the centerline, including high and low points along the profile. If a street includes new curb and gutter, such stakes can also be provided at designated offsets behind the back of curb. Where grade stakes are provided by the engineer, cut and fill calculations will be provided at all designated grade stakes.
- d. The Contractor shall provide a minimum of 1 week notice to the Engineer of the need for grade stakes, unless the Contractor is responsible for Staking.
- e. The Contractor is responsible for maintaining and preserving grade stakes set by the Engineer. Re-staking, if required, is the responsibility of the Contractor, unless Owner, Engineer agree that extenuating circumstances were in play outside of the Contractor's control where the original stakes were not preserved in a timely manner.

3. PLACEMENT.

- a. CABC shall be placed to minimize segregation of aggregate and to allow for uniform distribution on the subgrade.
- b. Material shall be placed in a maximum 6-inch compacted thickness. Compacted lift thickness shall be as follows:

Total Base Thickness	Section Layer Thickness
8"	4" Lower, 4" Top
9"	5" Lower, 4" Top
10"	5" Lower, 5" Top
12"	6" Lower, 6" Top
14"	6" Lower, 4" Mid, 4" Top

- c. Compact each layer to 95% of the maximum dry density in accordance with ASTM D1557. If the material is deficient in moisture content for readily attaining the required density, moisten the material as necessary.
- h. The Contractor shall protect the work by placing base in the same day on subgrade surfaces or prior base layers. Maintain the base until pavement is put down, or until the engineer accepts the work.

4. TOLERANCES.

- a. Compacted Thickness. Plus or minus 1/4 inch.
- b. Surface Uniformity. Maximum variation of 3/8 inch when measured with a 10-foot straight edge.

5. CABC PROOF-ROLL (AS REQUIRED).

- a. The Work shall be prepared with a representative and uniform surface.
- b. A loaded tandem-axle dump truck shall be used, or equivalent with a minimum gross weight of 30 tons. Equivalent vehicles shall be approved for use by the Engineer.
- c. The proof-roll shall be coordinated for observation by the Owner and the Engineer.
- d. The Contractor is responsible to conduct any necessary testing of base course layers, including compaction testing & advance proof-rolling.
 - 1. Density shall be determined according to the provisions of ASTM D2922.
 - 2. Moisture content shall be determined according to the provisions of ASTM D3017.
 - 3. Sampling shall be completed in accordance with WisDOT 301.2.3
- e. Soft areas, yielding areas, cracked areas or areas where rolling or wave action is observed shall be considered unsatisfactory.

- f. Unsatisfactory base layers shall be remedied by undercutting, replacement with suitable structural base material, compaction and finish grading.
 - g. Undercut sub-base shall be proof-rolled again for inspection by the Owner and Engineer for verification of structural base compliance.
- 6. QUALITY CONTROL.
 - a. The Contractor is responsible for meeting the compaction requirements. The Engineer or authorized representative of the Owner has the option to require the Contractor to hire an independent testing firm, at the Contractor's expense, to perform compaction tests to confirm the in-place density.
 - b. Field inspection will be performed by the Engineer or the Owner (or designee).
 - c. If testing results in deficiencies in the Work, remove and replace the Work.

D. MEASUREMENT & PAYMENT

- 1. MEASUREMENT. Measurement of CABC & Breaker Run shall be by the square yard of installed Asphalt surface, unless the Bid provides for a Lump Sum measurement.
- 2. PAYMENT. The Contractor shall be paid for furnished and installed CABC and Breaker Run according to the measurement as identified above including acceptance by Owner and Engineer, following the project and Owner specified pay request procedures.

--END OF SECTION--

32 1216 HOT MIX ASPHALT (HMA) PAVEMENT

A. BACKGROUND

1. DESCRIPTION. This specification includes details necessary to provide and place Hot Mix Asphalt (HMA) concrete as a roadway surface material finished product.
2. REFERENCES.
 - a. WDOT. Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition.
3. SUBMITTALS.
 - a. Pre-Construction- Submit mix design, meeting all necessary criteria for all mixtures to be used on the project. Conduct the mix design in accordance with WDOT 460.
 - b. During Construction- Submit density testing records.
4. QUALITY ASSURANCE.
 - a. Qualifications of Asphalt Producer- Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in the production of hot-mix, hot-laid asphalt concrete.
 - b. Qualifications of Testing Agency- Use only recognized commercial testing laboratory, experienced in testing asphalt concrete materials.
5. PLACEMENT & SITE CONDITIONS.
 - a. Weather Conditions.
 1. Asphalt concrete surface course material shall not be placed during the calendar period between October 15th and May 1st except with written approval of the Engineer.
 2. Asphalt concrete material shall not be placed when air temperature is less than 35 Degrees Fahrenheit as measured 3 feet above the ground in the shade away from the effects of artificial heat.
 3. Asphalt concrete materials shall not be placed:
 - i. On frozen base course
 - ii. On excessively wet base course or when it is raining.
 - iii. On excessively wet surfaces
 - iv. On unprepared asphalt surfaces (applicable only to wedging projects)
 - b. Traffic Conditions.
 1. Maintain vehicular and pedestrian traffic during paving operations as required for other construction activities.
 2. Provide flagmen, barricades, warning signs and lights as needed to provide for safety and movement of traffic.

B. MATERIALS

1. ASPHALTIC MIXTURE DESIGN.
 - a. Conduct the asphaltic mixture design in accordance with WIDOT Table 460-2. Mixture requirements are as follows:

Mixture Type	LT	MT	HT
LA Wear (AASHTO T 96)	13	13	13
100 Revolutions (max % loss)	50	45	45
500 Revolutions (max % loss)			
Soundness (AASHTO T 104) (sodium sulfate, max % loss)	12	12	12
Freeze/Thaw (AASHTO T 103) (specified counties, max % loss)	18	18	18
Fractured Faces (ASTM D5821) (one face/2 face, % by count)	65	75 / 60	98 / 90
Flat or elongated (ASTM D4791) (max % by weight)	5 (5:1 ratio)	5 (5:1 ratio)	5 (5:1 ratio)
Fine Aggregate Angularity (AASHTO T 304, Method A, min)	40	43	45
Sand Equivalency (AASHTO T 176, min)	40	40	45
Clay Lumps and Friable Particle in Aggregate	<=1%	<=1%	<=1%
Gyratory Compaction			
Gyrations for N _{ini}	6	7	8
Gyrations for N _{des}	40	75	100
Gyrations for N _{max}	60	115	160
Air Voids, %V _a	4.0	4.0	4.0
%G _{mm} @N _{des}	96.0	96.0	96.0
%G _{mm} @N _{ini}	<91.5 ⁽¹⁾	<89.0 ⁽¹⁾	<89.0 ⁽¹⁾
%G _{mm} @N _{max}	≤98.0	≤98.0	≤98.0
Dust to Binder Ratio ⁽²⁾ (% passing 0.075/P _{be})	0.6 – 1.2	0.6 – 1.2	0.6 – 1.2
Voids filled with Binder (VFB or VFA, %)	68-80 (4)(5)	65-75 (4)	65-75 (4)
Tensile Strength Ratio – TSR (ASTM D4867)			
No anti-stripping agent	0.75	0.75	0.75
With anti-stripping agent	0.80	0.780	0.80
Draindown at Production Temperature (%)	-----	-----	-----

^[1] For No 6 (4.75 mm) nominal maximum size mixes, the specified fine aggregate angularity is 43 for LT and 45 MT mixes.

^[2] For No 6 (4.75 mm) nominal maximum size mixes, the specified sand equivalency is 43 for MT mixes.

^[3] The percent maximum density at initial compaction is only a guideline.

^[4] For a gradation that passes below the boundaries of the caution zone (ref. [AASHTO M323](#)), the dust to binder ratio limits are 0.6 - 1.6.

^[5] For No 6 (4.75 mm) nominal maximum size mixes, the specified dust to binder ratio limits are 1.0 - 2.0 for LT mixes and 1.5 - 2.0 for MT and HT mixes.

^[6] For No. 6 (4.75mm) nominal maximum size mixes, the specified VFB is 67 - 79 percent for LT mixes and 66 - 77 percent for MT and HT mixes.

^[7] For No. 5 (9.5mm) and No. 4 (12.5 mm) nominal maximum size mixtures, the specified VFB range is 70 - 76 percent.

^[8] For No. 2 (25.0mm) nominal maximum size mixes, the specified VFB lower limit is 67 percent.

^[9] For No. 1 (37.5mm) nominal maximum size mixes, the specified VFB lower limit is 67 percent.

2. AGGREGATE

- a. Provide aggregate conforming to WIDOT Table 460-1. Aggregates shall consist of hard durable particles and shall not contain more than a combined total of one percent, by mass, of lumps of clay, loam, shale, soft particles, organic matter, adherent coatings, and other deleterious materials. The composite aggregates shall conform to the requirements of the Mixture Requirements Table and the Aggregate Gradation Table.

	PERCENT PASSING DESIGNATED SIEVES							
	NOMINAL SIZE							
	No. 1 (37.5 mm) (1 1/2 inch)	No. 2 (25.0 mm) (1 inch)	No.3 (19.0 mm) (3/4 inch)	No. 4 (12.5 mm) (1/2 inch)	No. 5 (9.5 mm) (3/8 inch)	No. 6 (4.75 mm) (3/16 inch)	SMA No. 4 (12.5 mm) (1/2 inch)	SMA No. 5 (9.5 mm) (3/8 inch)
50.0-mm (2-inch)	100							
37.5-mm (1 1/2-inch)	90 - 100	100						
25.0-mm (1-inch)	90 max	90 - 100	100					
19.0-mm (3/4-inch)		90 max	90 - 100	100			100	
12.5-mm (1/2-inch)			90 max	90 - 100	100		90 - 97	100
9.5-mm (3/8-inch)				90 max	90 - 100	100	58 - 80	90 - 100
4.75-mm (No. 4)					90 max	90 - 100	25 - 35	35 - 45
2.36-mm (No. 8)	15 - 41	19 - 45	23 - 49	28 - 58	32 - 67	90 max	15 - 25	18 - 28
1.18-mm (No. 16)						30 - 55		
0.60-mm (No. 30)							18 max	18 max
0.075-mm (No. 200)	0 - 6.0	1.0 - 7.0	2.0 - 8.0	2.0 - 10.0	2.0 - 10.0	6.0 - 13.0	8.0 - 11.0	8.0 - 12.0
% VMA	Min. 11.0	Min.12.0	Min. 13.0	Min. 14.0 ^[1]	Min. 15.0 ^[2]	Min.16.0 - Max. 17.5	Min. 16.0	Min. 17.0

- c. Unless otherwise designated in the contract, the nominal size of aggregate used in the mixture shall conform to the following:

Pavement Thickness	Aggregate Size	
	Binder	Surface
3"	1/2"	1/2"
3 1/2"	1/2"	1/2"
4"	3/4"	1/2"
4 1/2 "	3/4"	1/2"
5"	3/4"	1/2"

3. ASPHALT CEMENT

- a. PG 58-28 or as provided in the Bid Form.
- b. Tack Coat: Emulsified Asphalt – Grade SS-1; WDOT 455

C. EXECUTION.

1. LINES AND GRADE.

- a. Lines and Grade shall be as shown on the drawings or as given by the Engineer.
- b. When curb and gutter is in place, the Contract shall use the curb and gutter for line and grade. Street centerline elevations will be confirmed based on the desired cross-slope included within the Drawings or as directed by the Engineer.
- c. Parking lots will be staked as required.

2. SURFACE PREPARATION.

a. Proof Roll

- 1. Proof-roll prepared base surface using heavy rubber-tired roller or loaded tandem-axle dump truck under observance of the Engineer. Aggregate surface shall not rut or displace significantly under the weight of the equipment. Soft or unstable areas that cannot be improved by additional compaction shall be undercut, replaced with suitable fill material and recompacted.
- 2. Do not begin paving until necessary corrections are made.

b. Loose and Foreign Material

- 1. Remove loose and foreign materials from compacted base or old surface course immediately before paving.
- 2. Use power brooms or blowers and sweep with hand brooms as required.

c. Tack Coat.

- 1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or Portland cement concrete and similar surfaces.
- 2. Apply at a minimum rate of 0.05 gallons per square yard of surface with a power distributor.
- 3. Apply only when air temperature is 36° F or higher.
- 4. Apply tack coat by brush to contact surfaces of curbs, gutters, manholes and other structures projecting into or abutting asphalt concrete pavement.

d. Existing Pavement Correction

- 1. Fill potholes, sags and depressions.
- 2. Materials may be placed by hand.

3. FRAME ADJUSTMENTS.

- a. Set frames of subsurface structures to final grade. Covers shall be ½ -inch below the surface of adjacent pavement.

4. PREPARING THE MIXTURE.

- a. Comply with the applicable sections of WIDOT 450 for material storage, control, mixing and for plant equipment and operation.

5. EQUIPMENT.

- a. Provide size and quantity of equipment to complete the work specified within the project time schedule.
- b. Paving shall be placed with a self-propelled spreading and finishing machine that spreads the hot-asphalt concrete mixture without tearing, shoving or gouging the surface and that controls pavement edges to true lines without use of stationary forms.

- c. Rolling equipment shall be self-propelled steel-wheel rollers of the three-wheel, tandem of three-axle tandem type. Three-wheel and tandem rollers shall be rated at not less than 8 tones. Three-axle tandem rollers shall be rated at not less than 12 tons.

6. PLACING THE MIX.

- a. Do not place asphaltic mixture when the air temperature approximately three feet above grade, in shade, and away from artificial heat source is less than 36° F.
- b. Place asphalt concrete mixture on prepared surface, spread and strike off using paving machine.
- c. Spread mixture at a temperature between 250° and 350° F.
- d. Inaccessible and small areas may be placed by hand.
- e. Place each course at thickness so that when compacted, it will conform to the indicated grade cross section, finish thickness and density specified.
- f. Compacted Thickness of Individual Layers:

Pavement Thickness	Layer Thickness	
	Binder	Surface
3"***	1 ½"	1 ½"
3 ½"	1 ¾"	1 ¾"
4" *	2 ¼"	1 ¾"
4 ½"	2 ¾"	1 ¾"
5"	3"	2"

* A 2-inch lower layer may be paved with a 2-inch upper layer

** A 3" finished pavement overlay may be laid in one (1) lift

g. PAVER PLACING.

- 1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section and at high side of sections on one-way slope and in direction of traffic flow.
- 2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
- 3. Complete binder course for a section before placing surface course.

h. HAND PLACING.

- 1. Spread, tamp and finish mixture using hand tools in areas where machine spreading is not possible.
- 2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.

i. JOINTS.

- 1. Carefully make joints between old and new pavements or successive day's work to ensure a continuous bond between adjoining work.
- 2. Clean contact surface free of sand, dirt or other objectionable material, and apply tack coat.
- 3. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.

7. COMPACTING THE MIX.

- a. While the mixture is still hot, compact thoroughly and uniformly by rolling. Provide sufficient numbers of rollers to obtain the required density and accomplish the rolling.
- b. Begin rolling operations as soon after placing as the mixture will bear weight of roller without excessive displacement.

- c. Do not permit heavy equipment, including rollers, to stand on finished surface before it has thoroughly cooled or set.
 - d. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
 - e. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
 - f. Do not roll centers of sections first.
 - g. Breakdown Rolling.
 - 1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
 - 2. Check crown grade and smoothness after breakdown rolling.
 - 3. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
 - h. Second Rolling.
 - 1. Following breakdown rolling as soon as possible while mixture is still hot and in condition for compaction.
 - 2. Continue second rolling until mixture has been thoroughly compacted.
 - i. Finish Rolling.
 - 1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
 - 2. Continue rolling until roller marks are eliminated and course has attained specified density.
8. PAVEMENT DENSITY.
- a. Pavements shall be built with the Maximum Density Method, WIDOT 460.3.3.2, unless otherwise specified.
 - b. Ordinary Compaction: Compact leveling, wedging, patching layers, driveways, and other non-traffic areas to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. Comply with WIDOT 450.3.2.6.
 - c. Maximum Density Method: All courses or layers thereof of plant mixed asphaltic mixtures for which the Maximum Density Method is used shall be compacted to a density not less than the percentage shown in the Table of Minimum Required Density, WIDOT Table 460-3, for the applicable mixture and course.
9. PAVEMENT DENSITY DETERMINATION.
- a. General.
 - 1. Density testing shall be performed by an independent testing firm, hired by the contractor or by a trained and qualified employee of the Contractor if approved by the Engineer. Densities may be determined on the basis of cored/sawed holes or nuclear methods.
 - 2. Density determination will be made as soon as practical after placement and compaction and prior to placement of subsequent layers. Do not re-roll compacted mixtures represented by samples or tests having deficient densities. Do not operate below the specified maximum density on a continuing basis. Stop production until the source of the problem is determined and corrected.
 - 3. A lot shall represent 750 tons of a mixture, or the quantity placed in one day if less than 750 tons, for each density requirement. Densities of binder and surface course mixtures shall be determined on the basis of nuclear methods. Random testing locations will be established by the Engineer.

- a. Tests. Five random tests will be taken on each lot. The lot density shall be the average of all samples taken.
- b. Compact all layers to the percent of the target maximum density as shown in the following table.

Minimum Required Density ⁽¹⁾		
Location	Layer	% of Target Maximum Density
		Mixture Type
		LT, MT
Traffic Lanes ⁽²⁾	Lower	93.0 ⁽³⁾⁽⁵⁾
	Upper	93.0
Shoulders and Appurtenances	Lower	91.0 ⁽⁵⁾
	Upper	92.0

^[1] The table values are for average lot density. If any individual density test result falls more than 3.0 percent below the minimum required target maximum density, the engineer will investigate the acceptability of that material according to [CMM 815.11](#).

^[2] Includes side roads, crossovers, turn lanes, ramps, parking lanes, bike lanes, and park-and-ride lots as defined by the contract plans.

^[3] Minimum reduced by 2.0 percent for a lower layer constructed directly on cold in-place recycle (CIR), crushed aggregate, or recycled base courses.

^[4] Minimum reduced by 1.0 percent for a lower layer constructed directly on cold in-place recycle (CIR), crushed aggregate or recycled base courses.

^[5] Minimum reduced by 1.0 percent for a 1.25-inch thick No. 5 mix lower layer constructed on a paved or milled surface.

- c. Density deficiency: When the density of a lot of compacted binder or surface course is less than the specified minimum, payment will be adjusted in accordance with following table:

Adjusted Payment Schedule	
Percent Lot Density Below Specified Minimum	Percent of Contract Price
From 0.5 to 1.0 inclusive	98
From 1.1 to 1.5 inclusive	95
From 1.6 to 2.0 inclusive	91
From 2.1 to 2.5 inclusive	85
From 2.6 to 3.0 inclusive	70
More than 3.0	*

* The lot shall be removed and replaced with a mixture at the specified density and, when acceptably replaced, will be paid for at the contract price; or the engineer may permit the unacceptable material to remain in place with a 50 percent reduction in payment.

10. SURFACE AND THICKNESS REQUIREMENTS.

a. GENERAL.

1. Provide final surface of uniform texture conforming to required grade and cross-section.
2. Test finished surface of each asphalt concrete course for smoothness using a 10-foot straightedge applied parallel to and at right angles to centerline of paved area.
3. Check surface areas at intervals directed by the engineer.
 - a. Binder course: ¼ inch in 10 feet.

- b. Surface course: $\frac{1}{4}$ inch in 10 feet.
- d. THICKNESS REQUIREMENTS.
 - 1. If the Engineer believes that the thickness of the compacted base or surface course is not at the specified thickness, the Contractor may be required to obtain 4-inch diameter samples to verify the thickness. The samples shall be obtained by sawing or coring and all sample holes shall be repaired with fresh mix and compacted.
 - 2. If the thickness is not as specified, it will be the Engineer's option to adjust the contract price, require an overlay, or require some other remedial action.

11. PATCHING

- a. Remove and replace defective areas.
 - 1. Cut out and fill with fresh hot-asphalt concrete.
 - 2. Compact by rolling to specified density and surface smoothness.
 - 3. Remove deficient areas for full depth of course.
 - 4. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
 - 5. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

12. CLEANING AND PROTECTION

- a. After the final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened and, in no case, sooner than 6 hours.
- b. Provide barricades and warning devices as required to protect pavement and the general public.

--END OF SECTION--

32 1313 CONCRETE WORK

A. GENERAL

1. BACKGROUND

a. Description

- i. This specification includes details necessary to provide and place Portland cement concrete (PCC). All concrete used on the project shall conform to these provisions.
- ii. The Contractor shall follow WisDOT specification for concrete pavement, 415. Conflicts in this specification with WisDOT 415 shall be communicated with the Engineer. Generally, the more restrictive specification shall apply.

b. References

- i. WisDOT, Standard Specifications for Highway and Structure Construction, 2018
- ii. WisDOT, Specification for Concrete Pavement, 415
- iii. Related American Society for Testing and Materials (ASTM) references for the following:
 1. Concrete Materials
 - a. ASTM C33: Standard Specifications for Concrete Aggregate
 - b. ASTM C94/C94 M-17a: Standard Specification for Ready-Mix Concrete
 - c. ASTM C150: standard Specifications for Portland Cement Type 1
 - d. ASTM C618: Standard Specifications for Coal Flyash and Raw or Calcined Natural Pozzolan for Use in Concrete
 2. Concrete Admixtures
 - a. ATSM C260: Standard Specifications for Air Entraining Admixtures for Concrete
 - b. ASTM C494: Standard Specifications for Chemical Admixtures for Concrete
 - i. Water Reducing Type A
 - ii. Accelerating (non-chloride) Type E
 - iii. Retarding Type D, Water Reducing and Retarding
 - iv. Water Reducing and Accelerating(non-chloride) Type E
 - v. Superplasticizers and a high-range water reducing admixtures meeting requirements Type F; Master Builders Rheobuild 1000 or equal.
 3. Steel Reinforcement
 - a. ASTM A82: Steel Wire, Plain, for concrete Reinforcement
 - b. ASTM A615/A615M-16: Standard Specification for Deformed and Plain Carbon-Steel bars for Concrete Reinforcement
 - c. ASTM A1064/A1064M-17: Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 4. Concrete Curing
 - a. ASTM C171: Standard Specifications for Sheet Materials for Curing Concrete
 - b. ASTM C309-11: Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete

5. Joint Fillers
 - a. ASTM D1751: Performed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - b. ASTM D1752: Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
6. Testing
 - a. ASTM C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C39/C39M-18: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - c. ASTM C143/ C143-15a: Standard Test Method for Slump of Hydraulic-Cement Concrete
 - d. ASTM C172: Standard Practice for Sampling Freshly Mixed Concrete
 - e. ASTM C231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- iv. Related American Concrete Institute (ACI) for the following:
 1. ACI 117-90: Standard Tolerance for Concrete Construction Materials
 - a. ACI 301-96: Structural Concrete for Buildings
 2. ACI 305R-91: Hot Weather Concreting
 3. ACI 306R: Cold Weather Concreting
 4. ACI 308-92: Standard Practice for Curing Concrete
 5. ACI 318-95: Building Code Requirements for Reinforced Concrete
 6. ACI 347-94: Guide Framework for Concrete
- c. Submittals
 - i. Design mixes shall be approved by Engineer a minimum of five working days prior to delivery of concrete to the site with the following information:
 1. Provide dry weight of cement, saturated-surface dry weight of aggregate, brand name, type and quantity of admixtures and pounds of water per cubic yard of concrete.
 2. Test data supporting the portions of the design mixes based on laboratory trial batches in accordance with ACI 318. Test data supporting the proportions of the design mixes based on past field experience in accordance with ACI 318 may be provided in lieu of the laboratory data.
 - ii. Formwork: Submit manufacturer's Data and installation instructions for proprietary materials including form coating, ties and accessories and manufactured form systems
 - iii. In addition to provide test results to the Engineer, provide the test results to the concrete supplier
 - iv. Allow Engineer to inspect concrete surfaces immediately upon removal of forms
 - v. Repair or replacement of defective concrete will be determined by the Engineer
 - vi. Admixtures: Submit manufacturer's literature and certifications to the Engineer
 - vii. Surface Treatment: Submit manufacturer's literature and application recommendations to the Engineer
 - viii. Delivery Tickets: With each load of concrete delivered, duplicate delivery tickets shall be provided, which give the following information:
 1. Name of ready-mix batch plant
 2. Serial number of ticket

3. Date
 4. Truck number
 5. Name of contractor
 6. Name and location of job
 7. Class or designation of concrete
 8. Amount of concrete in cubic yards
 9. Time loaded or of first mixing of cement and aggregate
 10. Water added at jobsite and initials of person authorizing addition
 11. Admixtures, if added
- d. Approval
- i. Do not cut or move reinforcement to accommodate embedded items without approval of the Engineer
 - ii. Do not move bars beyond allowable tolerances without approval of Engineer
 - iii. Do not heat, bend or cut bars without approval of the Engineer
 - iv. All reinforcing shall be approved by the Engineer prior to placing concrete
 - v. Do not add water to the mix after the initial introduction of water without the approval of the Engineer. If water is added at the jobsite, the concrete shall be iced a minimum of 30 drum revolution. Any water added shall not bring the total water in the mix to an amount above the specified water-cement ratio
 - vi. Notify the Engineer a minimum of 24 hours prior to concrete placement
 - vii. Provide joint to form panels or patterns as indicated on the Drawings. IF joints are not shown, consult Engineer for joint placement
- e. Placement Limitations
- i. Cold Weather Placement
 1. Cold weather is defined as for more than 3 consecutive days the average temperature is less than 40°F and does not raise above 50°F in a 12-hour period
 2. Once temperatures go below 50°, if and admixture is added to the concrete a new mix design must be submitted to the Engineer for evaluation. C494/ C494M-17
 3. Temperature of concrete as placed should be as close to the minimum recommended value as possible (55°F) ACI 306R-88 Chpt. 3.1
 4. Non-chloride admixtures may be used, but placement, curing and protection requirements must be observed. ASTM C494/ C494M-17
 5. Concrete must reach a minimum strength of 500 psi to protect the concrete from 1 freeze cycle. ACI 306R-88 Chpt. 5
 6. If subjected to more than one cycle of freezing, the concrete must reach a minimum of 4,000 psi before being exposed to ambient air temperatures with a minimum of 6 cement bags per cubic yards (Air-entrained concrete only).
 7. Minimum exposure temperatures for concrete slabs will be determine from Tables 7.3.1-7.3.4
 8. Concrete should not be exposed to temperatures 20° above the minimum placement temperatures. ACI 306R-88 Chpt.7.4
 9. The temperature of the concrete and the ambient air shall be recorded at least twice in 24-hour periods. Temperatures should be taken at more than one location, on edges and corners

10. Combustion heaters need to be vented to prevent carbonation (carbon dioxide reacting with calcium hydroxide to form calcium carbonite) of concrete which causes a weak and dusty surface ACI 306R-88 Chpt 7.4
11. If concrete temperature is greater than 60°F and the air temperature is 50°F, the concrete needs to be protected from drying by using curing compound or steam heating ACI305R 3.4.1
- ii. Warm Weather Placement
 1. The maximum allowable temperature that concrete should be placed is 95°
 2. Submit to the engineer for acceptance a request for a specific higher maximum allowable concrete temperature
 3. The submittals for hot weather concrete shall indicate which methods of cooling will be used and in what order they will be initiated when multiple methods are to be used. The substitution of other cooling methods will be considered by the Engineer. ACI 305R 3.4.1
 4. Concrete placement and finishing operations shall proceed as quickly as conditions will permit. ACI 305R 3.5
 5. Control concrete surface bleed-water evaporation with application of evaporation reducers, plastic sheeting, fog spray or wind breaks. Use these materials and methods in accordance with ACI 308.01
 6. Cure concrete in accordance with ACI 308.1
 7. Protect the concrete against thermal shrinkage cracking due to rapid drops in concrete temperature greater than 40° during the first 24 hours unless otherwise specified
- iii. Inclement Weather: Concrete shall not be placed between October 15 and May 15 shall be covered with plastic and insulated with hay or other approved insulation, for not less than 7 days or more than 14 days
- iv. The contractor is still responsible for following all required in ACI 306R and the American Public Works Association. If a contractor has decided to place concrete in cold weather, they must provide documentation of the ground temperatures (base and sub-base), procedures that will be used to protect the concrete from freezing, recording of concrete

2. MATERIALS

- a. Use materials that conform to the following:
 - i. WisDOT Standards. All materials provided on the project shall meet the minimum requirements of the WisDOT
 - ii. Water. NO water shall be added when placing concrete unless approved by the Engineer. IF water is added without consent of the Engineer, this shall be considered sufficient grounds for rejecting the concrete

B. PRODUCTS

1. Forms
 - a. Wood Forms
 1. Plywood: PS1, BB Grade, Class 1
 2. Clean, straight lumber, dressed on face and edges, 2-inch nominal thickness
 - b. Preformed Steel Forms: Minimum 16 gauge matched, tight-fitting stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces

- c. Plan Type: Steel of size and profile required
 - d. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reuseable of sizes required
- 2. Formwork Accessories
 - a. Form Ties: Snap-off type, galvanized metal, adjustable length, cone-type, 1-inch breakback dimension. The tie shall not leave holes larger than one-inch diameter in concrete surface.
 - b. Form release agent: Colorless mineral oil which will not stain concrete, absorb moisture or impair natural bonding of coating intended for use on concrete
 - c. Chamfered Corners: When drawings indicate chamfered corners, provide wood strip type.
 - d. Nails, Spikes, Lag Bolts, Through Bolts and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete
 - e. Waterstop: Polyvinyl chloride with preformed corner sections and heat-welded jointing
 - 1. Non-moving Construction Joints: 6" ribbed, 3/8" thick, non-tapered, 5/8" rib diameter; Greenstreak 679 or equal
 - 2. Expansion and Moving Construction Joints: 9" ribbed with center ball, 3/8" thick, non-taped, 5/8" rib diameter, 1" O.D. and 1/2" I.D. center bulb; Greenstreak 735 or equal
- 3. Formwork Design
 - a. Design formwork to safely support vertical and lateral loads that may be applied until such loads can be supported by the concrete structure
 - b. Design formwork to carry loads to ground or to concrete that has attained adequate strength
 - c. Design formwork to include assumed values of live load, dead load, weight of equipment to be operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressure, stresses, lateral stability and other factors pertinent to the safety of the structure during construction
 - d. Support form facing materials to prevent deflection
 - e. Provide camber as required for anticipated deflections due to weight and pressure of fresh concrete and construction loads
- 4. Reinforcement
 - a. Reinforcing Steel: ASTM A615; Grade 60, deformed, unfinished bars for concrete reinforcement
 - b. Welded Steel Wire Fabric: ASTM A1064: flat sheets, unfinished
- 5. Reinforcement Accessories
 - a. Tie Wire: Minimum 16 gauge annealed-type
 - b. Chairs, Bolsters, Bar Supports, Spacers: Sized and Shaped for strength and support for reinforcement during concrete placement conditions
 - c. Splice Devices: Sized to develop 125 percent yield strength of bar
- 6. Concrete Material
 - a. Portland Cement: ASTM C150, Type 1
 - b. Use grading and quality of aggregate in conformance with ASTM C33
 - c. Water: Clean and not detrimental to concrete
 - d. Flyash: ASTM C618, Class C
- 7. Concrete Admixtures
 - a. Air Entrainment: ASTM C260
 - b. Water Reducing: ASTM C494, Type D, Water Reducing and Retarding
 - c. Accelerating: ASTM C494 Type C Accelerating (non-chloride); Type E, Water Reducing and Accelerating (non-chloride)

- d. Superplasticizer: A high-range water reducing admixture meeting requirements of ASTM C494, Type F; Master Builders Rheobuild 1000 or equal
- 8. Accessories
 - a. Vapor Retarders: 6 mil thick, clear polyethylene film, type recommended for below grade application
 - b. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water-reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days
- 9. Concrete Mix Design
 - a. Mix and deliver concrete in accordance with ASTM C94
 - b. Select proportions in accordance with ACI 301
 - c. Provide concrete in accordance with the following requirements:
 - d. Concrete Mixes

Concrete Mixes		
Class	Compressive Strength at 28 days, psi	Maximum Water-Cement Ratio, by Weight
Plain Concrete		
A	5,000	0.48
B	4,000	0.57
C	3,500	0.62
Air-Entrained Concrete		
D	4,000	0.48

- e. Air Content: Total air content (entrained and entrapped) for air-entrained concrete shall be in accordance with the following table:

Air Content	
Nominal Max. Size Aggregate	Air Content
¾"	6% ± 1
1"	6% ± 1
1 ½"	5% ± 1

- f. In any mix, up to 20% of cement (on a pound per pound basis) may be replaced with flyash
- g. Superplasticizer: Superplasticizer may be used at the Contractor's option. See Drawings for any locations where superplasticizer shall generally be added at the plant but may be added at the jobsite
- h. Concrete Schedule: Unless otherwise indicated in the Contract Documents provide concrete in accordance with the following schedule:

Concrete Schedule	
Concrete Class	Location
Class A	Walls below grade in contact with earth Walls & floors where water tightness is Required (i.e. tanks)

Class B	Structural slabs Building columns Exterior walls Interior precast topping
Class C	Footings Interior walls Interior slabs-on-grade
Class D	Exterior slabs Exterior precast topping Retaining walls Curb & gutter and sidewalk Other similar exterior concrete

i. Slump:

Location	Slump (inches)	
	Maximum	Minimum
Reinforced foundation walls, exterior walls and footings	3	1 ½
Footings, caissons and substructure walls	3	1 ½
Beams, columns and interior walls	4	1 ½
Precast topping	3	1 ½
Pavements and slabs	3	1 ½
Mass Concrete	2	1

1. Superplasticized concrete slump: 7 inches, not to exceed 10 inches. Do not use less than the manufacturer's recommended minimum dose. Adjust "water slump" (slump before superplasticizer addition) to be in line with Section D, above, and then utilize and appropriate superplasticizer dose to meet this final slump

10. Concrete Sealers

- a. Hardener/Sealer: A water-soluble sealer densifier that produces a dense surface resistant to abrasion, moisture, tire marking and provides added gloss to the floor finish.
- b. Manufacturer: Kure-N-Harden, Degussa Building Systems or equal

C. EXECUTION

1. Execution- General

a. Preparation

1. Verify subgrade matches the desired grade, cross section and elevation
2. In fill areas, subgrade shall be compacted to compaction testing results and shall be supplied at no extra cost if requested by the Engineer
3. Smooth subgrade to remove nuts, abnormalities, large stones and debris
4. Subgrade shall meet the requirements as set forth in 31 22 00 Site Excavation and Earthwork

b. Lines and Grade

1. Base course shall be placed accordingly to the line, grade and cross section as shown on the Drawings or as directed by the Engineer

2. For rehabilitation projects where curb and gutter are present, the line and grade will be provided by construction stakes set at a maximum 50-foot intervals (or increased intervals as required for bends, radii or vertical curves).
 3. The Contractor shall provide a minimum of 1 week notice to the Engineer of the need for grade stakes.
 4. The Contractor is responsible for maintaining and preserving grade stakes set by the Engineer. Re-staking, if required, is the responsibility of the Contractor, unless Owner and Engineer agree that extenuating circumstances were in play outside of the Contractor's control where the original stakes were not preserved in a timely manner.
- c. Base
1. Compact concrete base material to 95% of the maximum dry density in accordance with ASTM D1557. If the material is deficient in moisture content for readily attaining the required density, moisten the material as necessary.
2. Delivery
- a. Delivery and discharge concrete with 90 minutes or before 300 drum revolutions, whichever comes first, after the addition of water to the cement. Water added to the mix shall be under the direction of the Engineer
 - b. Do not add water to the mix after the initial introduction of water without the approval of the Engineer. If water is added at the jobsite, the concrete shall be iced a minimum of 30 drum revolutions. Any water added shall not bring the total water in the mix to an amount above the specified water-cement ratio
 - c. The temperature of the concrete as delivered shall not exceed a temperature of 90° F
 - d. When the average of the highest and lowest temperatures during the period from midnight to midnight is expected to drop below 40°F for more than three successive days, concrete shall be delivered to meet the following temperature immediately after placement.
3. Placing Concrete
- a. Place concrete in accordance with ACI 318
 1. Check grades and placement of forms
 2. Remove debris, water and excess oil from forms
 3. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed and anchored securely
 4. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent
 5. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert dowels and pack solid with non-shrink grout
 6. Round edge of walks and edge of joints with a ¼" radius edger
 7. Surface and edges of place concrete shall not have tool marks, unusual delineations, sags, hump or honey-combing
 - b. Notify Engineer a minimum of 24 hours prior to concrete placement
 - c. Ensure reinforcement, inserts, embedded parts, formed expansion joints and contraction joints are not disturbed during concrete placement
 - d. Install vapor retarder under interior slabs on grade. Lap joints a minimum of six inches and seal watertight by taping edges and ends
 - e. Deposit concrete as close as practical to its final position. Do not drop concrete more than five feet vertically. Superplasticizer concrete may be dropped a maximum of five feet vertically with maximum lift depth of five feet.

- f. Place concrete continuously between predetermined construction joints
- g. Do not interrupt the placement. Do not permit cold joints
- h. Thoroughly consolidate concrete by suitable means during placement. Thoroughly work concrete around reinforcement and embedded items and into corner of forms
- i. Install joint devices in accordance with manufacturer's instructions
- j. Contraction Joints
 - 1. Provide at 5-foot intervals
 - 2. Joints shall be tooled or cut at least $\frac{1}{4}$ of the depth (minimum 1") and rounded with a $\frac{1}{4}$ " edger tool. Joints shall be $\frac{1}{8}$ " in width plus or minus $\frac{1}{16}$ "
- k. Expansion Joints
 - 1. Provide at approximately 100' intervals, at walk and abutting curb sections (outwalks, ramps, driveways or buildings).
 - 2. Joints shall be $\frac{1}{2}$ " thick preformed filler, extending the full depth of the concrete with the top slightly lower than the finished surface
- l. Reinforcement
 - 1. Steel reinforcement (#5 bars) shall be used when concrete work crosses any utility trench, or as indicated on the Plans
 - 2. Provide a minimum cover of 1.5" from the rebar to any surface of the concrete
- m. Curing
 - 1. Cure and seal concrete with a uniform coating of membrane curing/sealing compound, in accordance with the manufacturer's recommendations
 - 2. Provide white pigment, ASTM C309, Type 2
- n. Protection
 - 1. Protect concrete from all traffic for at least three (3) days and from vehicular traffic for at least seven (7) days
- o. Testing
 - 1. Slump tests
 - a. Slump tests shall be made following the procedure in ASTM C143. The frequency of the tests shall be within the first 25 cubic yards and within each of the subsequent 50 cubic yards thereafter, or at the Engineer's discretion. If the measure slump falls outside the limits as determined by; the Engineer, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed to meet the requirements of the Specifications and shall not be used in the Work.
 - b. Cylinders
 - i. Concrete cylinders for strength tests shall be made in accordance with ASTM Method C31. Concrete cylinders shall be 6 inches in diameter and 12 inches in height. Concrete cylinder forms shall be supplied by the Contractor. A minimum of 3 cylinders shall be cast within the first 25 cubic yards and within each of the subsequent 50 cubic yards thereafter, or at the Engineer's discretion. Delivery and handling is the Contractor's responsibility.
 - c. Intervals
 - i. Concrete cylinders shall be tested at seven (7) days and at twenty-eight (28) days. The test results at 28 days shall be the average

strength of the specimens determined in accordance with ASTM Method C39, except that if one specimen in a test shows manifest evidence of improper sampling, molding or testing, it shall be disregarded.

ii. Failure

1. In the event a testing procedure yields a failed sample, the Engineer shall be notified and the work shall be deemed deficient. The remedy shall include either a deduct (if the failure shows strength of at least 85% of the desired strength) or removal of placed deficient concrete at the discretion of the Engineer.

p. Defective work

1. If the placed concrete cracks between contraction joints, settles or spalls within two (2) years of placement, the Engineer may require the defective concrete to be removed and replaced at no expense to Owner
2. Defective concrete that has been deemed for removal shall be removed at full sections, from joint to joint. Saw cuts shall only be approved by mutual agreement with the Owner or Engineer.
3. Provide two (2) #4 epoxy-coated dowel bars 12 inches long on both ends of the repair. Drill existing curb to a depth of 7 inches, providing a tight driven fit

4. Ramps

a. Handicap Ramps

1. Ramps shall be provided as shown on the Plans, having a detectable warning surface as follows:
 - a. Diamond pattern surface texture made by a special form or diamond metal mesh inset into the green concrete. Diamond pattern shall be 1 1/4" to 3/8" deep. The long dimension shall be parallel with the direction of travel
 - b. Truncated dome tiles in accordance with the Plans.

5. Form Construction

a. General

1. Construct Forms to produce concrete sections of the size, shape lines and dimensions indicated and as required to obtain accurate alignment, location, grade level and plumbness
2. Provide openings, offsets, keyways, molding, ringlets, chamfers, blocking, screeds bulkheads, anchorages, inserts and other required features.

b. Fabrication

1. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage concrete surfaces.
2. Provide top forms for incline surfaces where slope is too steep to place concrete with bottom forms only
3. Kerf wood inserts for forming keyways, ringlets, recesses and similar items to prevent swelling and to ensure easy removal
4. Provide temporary openings where interior framework is inaccessible for cleanout and inspection and concrete placement. Brace temporary openings in as inconspicuous location as possible.

5. Butt joints tight and provide back-up materials as necessary to prevent leakage of concrete paste.
- c. Falsework
 1. Support, brace and maintain falsework to safely support vertical, lateral and asymmetrical loads until loads can be supported by in-place construction. Provide shores and struts with positive means of adjustment capable of taking up settlement during concrete placement using wedges or jacks.
 2. Carefully inspect framework and formwork during and after concrete placement for abnormal deflections or sign failure. Make any necessary adjustments.
- d. Forms for Exposed Concrete
 1. Drill wood forms to suit ties used and to prevent leakage around tie holes. Do not splinter forms by driving ties through improperly prepared holes
 2. Provide sharp, clean corner at intersecting planes without visible edges or offsets. Back joints with extra studs or grits to maintain true intersections
 3. Use extra studs, walker and bracing to prevent bowing of forms between studs, do not use narrow strips of form material which allows bowing
- e. Corner Treatment
 1. Unless otherwise indicated, form chamfers with $\frac{3}{4}$ " x $\frac{3}{4}$ " strips accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to require limit and mite chamfer strips at changes in direction
- f. Provisions for other Trades
 1. Provide openings in formwork to accommodate other trades. Verify size and location with trade requiring the opening. Provide openings in accordance with approved shop drawings
 2. Accurately and securely support items to be built into forms. Other trades shall provide items to be installed and shall provide instructions and supervision as necessary
- g. Installation of Embedded Items
 1. Set and build into the work, anchorage devices and other embedded items required for work by other that is attached to or supported by cast-in place concrete. Use shop drawings, diagrams, template and/or instructions provided by suppliers or other trades
 2. Thoroughly brace embedded items to prevent movement during concrete placement. Lace items whenever possible
 3. Ducts, conduits, pipes and their fittings shall be installed below slabs whenever possible. When it is necessary to embed them within a slab, they shall not be larger than $\frac{1}{3}$ the thickness of the slab. Do not place adjacent ducts, conduits or pipes closer than three times the O.D. of the smallest element.
 4. Do not cut or move reinforcement to accommodate embedded items without approval of Engineer
- h. Edge Forms
 1. Set edge forms or bullheads and intermediate screw strips for slabs to obtain required elevations and contours in the finished slab surface
- i. Cleaning and Tightening
 1. Thoroughly clean forms and adjacent surfaces immediately prior to pouring concrete

2. Apply form release agent at the rate recommended by the manufacturer
 3. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks
6. Form Removal
- a. Formwork not supporting concrete, such as beams, walls, columns and similar items may be removed after curing at not less than 50°F for 24 hours after placement, provided concrete is sufficiently hard to not be damaged by form removal. Protection and curing shall be maintained after form removal
 - b. Formwork supporting the weight of concrete such as soffits, joists, slabs and other structural elements may not be removed in less than 14 days and not until concrete has attained design minimum 28- day compressive strength
 - c. Form-facing material may be removed four days after placement if shores and other vertical supports have been arranged to permit removal without loosening or disturbing shoring and supports
7. Reuse of Forms
- a. Clean and repair surface of forms to be used. Split, frayed, delaminated or otherwise damaged form-facing material should not be reused
8. Formwork Tolerance
- a. Tolerances shall meet requirements of ACI 347
9. Reinforcement Installation
- a. Steel Surface Condition
 1. Remove dirt, grease, oil, loose mill scale, excessive rust or foreign matter that may reduce bonding with concrete
 2. Steel with rust or mill scale may be used provided minimum dimensions, including height deformations and weight of hand wire-brushed test specimen, are not less than applicable ASTM C876-15 specifications
 - b. Bends
 1. Inside diameter of bend, other than for stirrups and ties in size No. 3 through No. 5, shall not be less than values in ACI 318, Table 7.2
 2. Inside diameter of bend for stirrups and ties shall not be less than 4x diameter for No. 5 bars and smaller. For bars larger than No. 5, diameter shall be in accordance with Table 7.2

ACI Table 7.2	
Bar Size	Minimum Diameter
No. 3- No. 8	6x Diameter
No. 9- No. 11	8x Diameter
No. 14- no. 18	10x Diameter

- c. Hooks
 1. Bends for hooks shall be in accordance with the following table

ACI Table 7.2	
Bar Size	Minimum Diameter
No. 3- No. 8	4x Diameter
No. 9- No. 11	5x Diameter

No. 14- No. 18	6x Diameter
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d. Placement

1. Accurately place and adequately secure reinforcement in position with concrete or metal chairs and spacers
2. Place slab reinforcement in the upper one-third of the slab
3. Clear distance between bars or layers of bars shall not be less than one inch or less than $1 \frac{1}{3}$ times the maximum size aggregate, whichever is greater
4. Move within tolerances to avoid interference with other reinforcing steel or embedded items
5. Do not move bars beyond allowable tolerances without approval of the Engineer
6. Do not heat, bend or cut bars without approval of the Engineer

e. Splices

1. Stagger splices in adjacent bars
2. Lap bars at least 6" or 24x bar diameters, whichever is greater
3. Securely wire so that contact is maintained over entire length of splice
4. Install splice devices in accordance with manufacturer's instructions

f. Wire Fabric

1. Install in longest practical length
2. Lap adjoining pieces one full mesh and tie
3. Do not make end laps midway between supporting beams or directly over beams of continuous structures
4. Offset in adjacent sheets
5. Extend to within two inches of edge of slab

g. Fastening

1. Tie bars at all intersections where spacing is one foot or greater. Where spacing is less than one foot, tie alternate sections

h. Protection

1. Keep reinforcing steel in proper position during concrete placement

i. Approval

1. All reinforcing shall be approved by the Engineer prior to placing concrete

10. Reinforcement Tolerances

a. Fabrication

1. Sheared length $\pm \frac{1}{4}$ "
2. Minimum spacing between bars +0' to -1/2"
3. Stirrups, ties and spirals: $\pm \frac{1}{4}$ "
4. All other bends ± 1 "

b. Placement

1. Concrete cover to formed surface: $\pm \frac{1}{4}$ "
2. Minimum spacing between bars: $\pm \frac{1}{4}$ "
3. Top bars in slabs and beams
 - a. Eight inches deep or less: $\pm \frac{1}{4}$ "
 - b. Eight inches but not over two feet: $\pm \frac{1}{4}$ "
 - c. More than two feet deep: $\pm \frac{1}{2}$ "
 - d. Crosswise members: Spaced evenly within ± 2 "
 - e. Lengthwise member: ± 2 "

- c. Maximum bar movement to avoid interferences with other reinforcing or embedded items:
one bar diameter
- d. Minimum concrete cover

Location	Minimum Cover
Slabs and Joints	
Top and bottom bars for dry conditions	
#11 and smaller	3/4"
#14 and #18 bars	1 1/2"
Formed concrete surfaces exposed to earth, water or weather and over in contact with sewage and for bottom bearing on work mat or slabs supporting earth cover	
#5 bars and smaller	1 1/2"
#6 through #18 bars	2"
Beams and Columns, formed	
For dry conditions	
Stirrups, spirals and ties	1 1/2"
Principal reinforcement	2 1/2"
Exposed to earth, water, sewage or weather	
Stirrups and ties	2"
Principal Reinforcement	2 1/2"
Walls	
For dry conditions	
#11 bars and smaller	3/4"
#14 and #18 bars	1 1/2"
Formed concrete surfaces exposed to earth, water, sewage Weather or in contact with ground	2"
Footings and base slabs	
At formed surfaces and bottoms bearing on concrete work mat	2"
At unformed surfaces and bottoms in contact with earth	3"
Top of footings	Same as Slab
Over top of piles	2"

11. Joints

- a. Construction Joints: Joints that are placed at the end of a day's work. In slabs they may be placed to permit movements and/or to transfer load
 - 1. Horizontal construction joints will not be permitted except as shown on the Drawings
 - 2. For building floor slabs on grade, locate joints a maximum distance apart of three times the slab thickness
 - 3. Provide keyways at least 1 1/2" deep or steel dowels in all construction joints in walls, slabs and between footings, columns and equipment base and drives and sidewalks from stairs, walks, light poles and other obstructions
- b. Expansion Joints: Joints that separate or isolate slabs from other parts of the structure such as walls, footings, columns and equipment base and drives and sidewalks from stairs, walls, light poles and other obstructions

1. Separate slabs on grade from vertical concrete surface with $\frac{3}{4}$ " preformed joint filler. Extend joint filler to within $\frac{1}{8}$ " of finished slab surface
- c. Control Joints: Joints in slabs to create planes of weakness so that cracks will occur at desired locations
 1. Provide joints to form panels or patterns as indicated on the Drawings. IF joints are not shown, consult Engineer for joint placement
 2. Inserts: Form $\frac{1}{4}$ " wide joints, one-fourth the depth of slab thickness (one inch minimum) by inserting pre-molded hardboard or fiberboard strips into the fresh concrete. The top surface of the strip shall be flush with the slab surface. After concrete has cured for a minimum of seven days, remove inserts and clean loose debris from the joints
 3. Sawed Joints (Normal): Saw joints as soon after concrete is set sufficiently to preclude raveling during sawing and before shrinkage crackling takes place. Saw joints no later than 24 hours after concrete placement. Joint shall be $\frac{1}{8}$ " wide and $\frac{1}{4}$ the slab thickness (depth shall be at least equal to the largest aggregate size)

12. Concrete Finishing

- a. Provide finishes in accordance with ACI 301, Section 5

Type	Finish	Comments
1	Screed off	
2	Rough form finish	Patch tie holes and defects. Chip or rub off fins exceeding $\frac{1}{4}$ " in height Leave surfaces with the texture imparted by form
3	Smooth form finish	Patch tie holes and defects Remove all fins completely Comply with rubbed finish
4	Smooth rubbed finish	Remove forms as early as permitted and perform necessary patching Produce finish no later than the day following removal Wet surface and rub with carborundum brick or other abrasive until uniform color and texture are produced Use cement grout
5	Floated finish	Place, consolidate, strike off and level concrete Float with hand float, bladed power float with flat shoes or power disk float when bleed water sheen has disappeared, and surface has stiffened sufficiently to allow floating
6	Toweled finish	Place, consolidate, strike off and level concrete Float with hand float, bladed power float with flat shoes or power disk float when bleed water sheen has disappeared, and surface has stiffened sufficiently to allow floating
7	Broom finish	Immediately after surface had been floated, give the surface a coarse scored texture using a broom

- b. Finished Schedule: Unless other indicated in the Contract Documents, finish concrete surfaces as follows:

Surface	Finish Type (ACI 301, Section 5)
Buried foundations, footings and footing walls	1 and 2

Buried walls	2
Exposed exterior walls and retaining walls	3
Interior walls	4
Interior process tanks	3
Tank grout and hopper fillets	6
Tank slabs and bases	5 (1 in grouted area)
Interior structural slabs and floors	6
Interior floors to receive quarry or ceramic tile	5
Interior beams, columns, lintels, etc.	4 or 6
Exterior slabs, steps, ramps and sidewalks	7
Equipment pads and foundations	4 or 6
Concrete topping for precast decks	6
Flumes and open channels	3 or 5

- c. In areas with floor drains, maintain floor elevations at walls; pitch surfaces uniformly to drains at 1/4" per foot as indicated on drawings

13. Curing and Protection

a. General

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury
2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening concrete
3. Cover concrete with polyethylene if rain is eminent
4. Cure concrete in accordance with ACI 308

14. Wet Fabric Method

- a. Place wetted burlap on concrete surface when the concrete is still wet, but firm enough to support the burlap without marring the surface. Lay the burlap flat on the concrete surface, overlapping adjacent strips by a minimum of six inches. After forms are removed, cover edge with burlap
- b. Keep burlap wet for seven days. Add water as necessary by fine spray

15. Plastic Film/ Reinforced Paper Method

- a. Place plastic film or reinforced paper on exposed concrete surfaces when the concrete is still wet, but firm enough to support the burlap without marring the surface. Place the material flat on the surface, without wrinkles. Weight materials so that it remains in contact with the concrete. Place soil or wood strips on material edges
- b. Keep covered for seven days

16. Liquid membrane-forming curing compound

- a. Apply after finishing as soon as the free water on the surface has disappeared and no water sheen is visible, but not so late that the curing compound will be absorbed into the concrete
- b. Apply uniform rate of 150 to 200 sq. ft. per gallon. When feasible, apply in two applications at right angle to each other with the second coat being applied within 30 minutes of the first.
- c. Coat edges within 30 minutes of form removal
- d. Use Type 2, white-pigmented, for concrete exposed to sunlight and Type 1, clear for other concrete

- e. Do not use liquid membrane-curing compound on surfaces that are to receive additional concrete, paint or tile that requires a positive bond, unless it has been demonstrated that the membrane can be satisfactorily removed or that it can serve as a satisfactory base.
17. Floor Sealing
- a. Unless indicated elsewhere, seal interior concrete doors
 - b. Apply the sealer in accordance with the manufacturer's instructions
18. Field Quality Control
- a. Sampling and testing shall be the responsibility of the Contractor
 - b. Provide free access to work and cooperate with testing personnel
 - c. Four concrete test cylinders will be taken for every 75 or less cubic yard of each class of concrete placed in one day. Test cylinders will be lab cured. One test cylinder will be broken at 7 days, two at 28 days and one will be held
 - d. Engineer may cast additional test cylinders for field curing; cold or hot weather may affect curing
 - e. One slump test, one air test and the concrete temperature will be taken for each set of test cylinders taken
 - f. Sampling and testing will be performed in accordance with the following:
 - 1. Concrete samples: ASTM C172
 - 2. Test cylinders: ASTM C31
 - 3. Slump test: ASTM C143
 - 4. Air test: ASTM C231
 - g. In addition to providing test result to the Engineer, provide the test results to the concrete supplier
19. Patching
- a. Allow Engineer to inspect concrete surfaces immediately upon removal of forms
 - b. Honeycomb, embedded debris and tie holes are not acceptable
 - c. Patch imperfections in accordance with ACI 301, Section 5
20. Defective Concrete
- a. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements
 - b. Repair or replacement of defective concrete will be determined by the Engineer
- D. METHOD OF MEASUREMENT
- 1. By the unit completed and accepted in final position
- E. BASIS OF PAYMENT
- 1. At the contract price, per unit of measurement, for each of the pay items shown in the bid schedule
 - 2. Payment will be made on completed items subject to acceptance.

--END OF SECTION--

SECTION 32 9200

TURF AND GRASSES

A. BACKGROUND

1. DESCRIPTION
 - a. This specification includes details necessary to furnish and complete topsoiling, fertilizing, seeding, mulching and maintenance of same during construction.
2. SUBMITTALS
 - a. Upon request, submit composition of fertilizer and seed mixture, or certification that materials meet all specification requirements.
3. REFERENCES
 - a. FS O-F-241 Fertilizers, Mixed, Commercial.
 - b. WDOT, Erosion Control Product Acceptability List (PAL)
4. DEFINITIONS
 - a. The definition for “Weeds” includes the following listing: Dandelion, Jimsonweed, Quack Grass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. MATERIALS

1. TOPSOIL
 - a. Provide reclaimed topsoil from the site and supplement with topsoil borrow from offsite.
 - b. Topsoil borrow shall be natural loam, sandy loam, silt loam, or silty-clay loam, humus bearing soil, adapted to sustaining plant life. The soil shall be free from rocks larger than 1” in diameter, other objects, toxic substances, or other foreign matter. Soil shall have a pH range between 5.5 and 7.0 and a maximum salt level of 500 PPM. Topsoil shall be suitable for placement in a residential environment and shall be free from noxious substances, such as manure, herbicides, pesticides or other non-organic contaminants.
2. SEED
 - a. L.L. Olds Seed Company
 - b. Reinders
 - c. The Scott’s Company
 - d. Horst Distributing
 - e. Wisconsin Turf
3. SEED MIXTURE
 - a. Lawn Seed Mixture shall be 50% Kentucky Bluegrass, 15% Creeping Red Fescue and 12% Chewing Fescue
 - b. Seed shall be applied at a seeding rate of 5-6 lbs per 1,000 square feet.
4. FERTILIZER
 - a. Standard commercial fertilizer (starter fertilizer) with the following available nutrients by weight, applied at a rate of 0.5 lbs. per 1,000 square feet:
 1. Nitrogen 10%
 2. Phosphoric Acid 18%
 3. Potash 22%
5. MULCH
 - a. Straw/Hay. Free from noxious weed seeds or objectionable foreign matter.
 - b. Paper Fiber. Recycled newsprint fibers, wetting agent, deforming agent and greet dye with a dry moisture content of between 9 and 15 percent.

- c. Wood Cellulose. Fibers manufactured from virgin wood fibers that form a blotter-like ground over that readily absorbs water and allows infiltration to the soil. Moisture content shall not exceed 18 percent at time of delivery. Dyed green.
- d. Mats. Biodegradable revegetative mat with a minimum thickness of 3/8" meeting the WisDOT, Erosion Control Product Acceptability List (PAL) for Class I, Type Urban mats. Anchoring devices shall also be biodegradable, shall last for a minimum of two months and shall substantially degrade in 5 months.

C. EXECUTION

1. INSPECTION

- a. Verify that prepared soil base is ready to receive work of this section.
- b. Beginning of installation means acceptance of existing site conditions.

2. PLACEMENT

- a. Stones, debris and other foreign materials shall be removed from the Work.
- b. Spread evenly to a minimum depth of 4 inches.
- c. Place during dry weather.
- d. Finish Grade to minimize rough spots, eliminate lumps, and ensure positive drainage at all times. Finish grading shall be expressly approved by the Owner and Engineer.

3. SEEDING

- a. Apply seed at a rate of 5-6 lbs. per 1,000 sq. ft. evenly in two (2) intersecting directions. Rake in lightly. Do not seed area in excess of that which can be mulched on same day.
- b. Planting Season: Starting May 1 through October 1.
- c. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- d. Drag seeded area with lightweight drag to cover seed and level soil.

4. FERTILIZING

- a. Apply fertilizer in accordance with manufacturer's instructions.
- b. Apply after smooth raking of topsoil and prior to roller compaction.
- c. Do not apply fertilizer at same time or with same machine as will be used to apply seed. Apply fertilizer after seed has been dragged and soil leveled.
- d. Mix thoroughly into upper 2" of topsoil.
- e. Lightly water to aid dissipation of fertilizer.

5. MULCHING

- a. Mulching type and method is the Contractor's option, unless establishment of seeding is a concern by the Owner or Engineer.
- b. Paper fiber mulch shall be placed with a hydraulic spray machine (water slurry) at an appropriate rate of per 1/4" layer.
- c. Wood Cellulose shall be placed with hydraulic spray machine (water slurry) at a rate of 1,500 lbs per 1/4" layer.
- d. Mats shall be placed on smooth and even ground in accordance with the manufacturer's recommendations.

6. MAINTENANCE

- a. Mow grass at regular intervals to maintain a minimum height of 2-1/2". Do not cut more than one-third (1/3) of grass blade at any one mowing.
- b. Neatly trim edges and hand clip where necessary.
- c. Immediately remove any clippings after mowing and trimming.
- d. Water to prevent grass and soil from drying out.
- e. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- f. Immediately re-seed areas which show bare spots.
- g. Protect seeded areas with warning signs during maintenance period.

D. MEASUREMENT & PAYMENT

1. This item shall be paid for acceptable work by the square yard (sy) of turf area.

-END OF SECTION-

SECTION 33 0507

UTILITY BORE & JACKING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Trenchless Installation of Carrier Pipe with Casing Pipe

1.02 REFERENCES

A. American Society for Testing and Materials:

ASTM A36	Standard Specification for Carbon Structural Steel
ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A139	Standard Specification for Electric-Fusion (Arc) - Welded Steel Pipe (NPS 4 and Over)
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A240	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D638	Standard Test Method for Tensile Properties of Plastics

B. American Welding Society:

AWS D1.1	Structural Welding Code - Steel
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1.03 SUBMITTALS

A. Action Submittals

1. Proposed installation methods and equipment along with plan to establish and maintain vertical and horizontal alignment.
2. Shop drawings of casing spacers and proposed spacing.

B. Informational Submittals

1. Submit certificate of compliance for steel casing pipe.
 2. Submit history of previous work completed of equivalent nature and scope.
 3. Submit qualification and experience statements of key personnel.
 4. Closeout Submittals
- C. Record Documentation of horizontal and vertical location of the installed casing pipe and carrier pipe.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications
1. Company specializing in performing work of this Section with minimum five years documented experience.
 - a. Include projects of similar magnitude and conditions
 - b. Furnish list of references.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements
1. Accept system components on site in manufacturer's original containers or configuration.
 2. Inspect for damage.
- B. Storage and Handling Requirements
1. Provide temporary end caps and closures on piping and fittings maintaining in place until installation.
 2. Protect piping and jacking systems from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
 3. Use wooden shipping braces between layers of stacked pipe. Stack piping lengths no more than three layers high.
 4. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.

5. Support casing and carrier pipes with nylon slings during handling.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use pipe materials stated on Drawings.
- B. Carrier Pipe
 1. Carrier Pipe Installed within Casing Pipe:
 - a. Sanitary Sewer Gravity Pipe: Comply to appropriate Specification Section
 - (1) Unrestrained joint PVC pipe with restrained joint casing spacers
 - b. Sanitary Sewer Force Main: Comply to appropriate Specification Section
 - (1) Restrained joint PVC pipe
 - c. Storm Sewer: Comply to appropriate Specification Section
 - d. Water Main: Comply to appropriate Specification Section
 - (1) Restrained joint PVC pipe
 2. Carrier Pipe Installed without Casing Pipe:
 - a. Sanitary Sewer Force Main: Comply to appropriate Specification Section
 - (1) Restrained joint PVC pipe C900-DR18
 - b. Water Main: Comply to appropriate Specification Section
 - (1) Restrained joint PVC pipe
- C. Casing Pipe
 1. Provide steel casing pipe:
 - a. Use only new, steel pipe meeting the requirements of ASTM A139, Grade B; ASTM A53, Grade B.

- b. Pipe may be welded or seamless.
- c. Provide minimum pipe diameter as shown on the Drawings.
- d. Provide pipe with minimum wall thickness in accordance with the following:

(1) Under roadways and other facilities:

Nominal Pipe Diameter (inches)	Nominal Wall Thickness (inches)
Under 14	0.282
14 and 16	0.282
18	0.312
20	0.344
24	0.406
26	0.438
30	0.469
32	0.500
36	0.532
42	0.563

(2) Under railroads:

Nominal Pipe Diameter (inches)	Nominal Wall Thickness (inches)
12" or less	¼" (0.2500")
Over 12" to 18"	5/16" (0.3125")
Over 18" to 22"	3/8" (0.3750")
Over 22" to 28"	7/16" (0.4375")
Over 28" to 34"	½" (0.5000")
Over 34" to 42"	9/16" (0.5625")
Over 42" to 48"	5/8" (0.6250")

2. Steel Pipe Joints:

- a. Comply with SWS D1.1
- b. Weld joints full circumference with full penetrating weld.

D. Casing Spacers

1. Provide manufactured casing spacers to position carrier pipe in casing. Do not use wood skids.
 2. Provide casing spacers meeting the following material requirements:
 - a. HDPE band/panel and riser meeting the requirements of ASTM D638.
 - b. Stainless steel or carbon steel band/panel and riser meeting the requirements of type 304 stainless steel according to ASTM A240 or carbon steel according to ASTM A36.
 - (1) Provide elastomeric PVC liner per ASTM D149.
 - (2) Provide abrasion resistant polymer spacer skid/runner with low coefficient of friction.
 - (3) Provide type 304 (18-8) stainless steel fasteners per ASTM A193.
 - (4) Provide restrained joint casing spacers when carrier pipe does not have restrained joints.
- E. Casing Pipe Annular Space Backfill Material
1. Provide M50 Grade Silica Sand Material.
- F. Casing End Seal – Provide one of the following:
1. Minimum 1/8 inch thick manufactured synthetic rubber casing end seal with stainless steel bands and fasteners.
 2. One of the following mortar mixes with minimum water to provide workable mixture:
 - a. Grout Mix No. 1:
1 part Portland cement, 1/4 part hydrated lime, 3 3/4 parts mortar sand (maximum).
 - b. Grout Mix No. 2:
1 part Portland cement, 1 part masonry cement, 6 parts mortar sand (maximum).
- G. Pressure Grout Mix:
One part Portland cement and six parts mortar sand mixed with water to consistency for pressure grouting.

H. Controlled Low Strength Materials (CLSM)

1. Approximate quantities per cubic yard:
 - a. Cement: 50 pounds
 - b. Fly Ash: 250 pounds
 - c. Fine aggregate: 2,910 pounds
 - d. Water: 60 gallons
2. A compressive strength of at least 50 psi at 28 calendar days.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
1. Verify connection to existing piping system size, location, and invert elevations are in accordance with the Drawings.
 2. Verify existing conditions before starting work.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities indicated to remain from damage.
- C. Notify and coordinate with utility company to remove and relocate utilities stated on Drawings for removal or relocation.
- D. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.

- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Establish minimum separation from other utility piping in accordance with the Specifications for piping type.
- G.

3.03 INSTALLATION

- A. Pit or Approach Trench Excavation
 - 1. Excavate trenches in accordance to appropriate Specification Section
 - 2. Ensure casing entrance face is perpendicular to alignment.
 - 3. Excavate the minimum size pits necessary to safely and properly perform the work.
 - 4. Provide shoring, if conditions require.
 - 5. Provide dewatering, if conditions require.
- B. Trenchless Installation
 - 1. Select a method of installation appropriate for the soil conditions anticipated and will 1) allow the pipe to be installed to the desired line and grade within the specified tolerances; 2) prevent heaving or settlement of the ground surface or damage to nearby facilities; and 3) prevent damage to the carrier pipe and any lining materials within the carrier pipe.
 - 2. Installation Methods:
 - a. Auger Boring: A method that utilizes a rotating cutting head to form the bore hole and a series of rotating augers inside a casing pipe to remove the spoil.
 - 3. Line and Grade:
 - a. Install pipe at line and grade that will allow the carrier pipe to be installed at its true starting elevation and grade within the specified maximum alignment deviation of the pipe centerline.
 - b. When no deviation tolerances are specified, apply the following maximum deviations to the carrier pipe.
 - (1) Gravity Pipe:
 - i) Horizontally: plus or minus 1.0 foot per 100 feet;

- ii) Vertically: plus or minus 0.2 feet up to 100 feet; an additional plus or minus 0.1 foot per 100 feet thereafter. Backfall in pipe is not allowed.

(2) Pressurized Pipe:

- i) Horizontally: ± 2.0 feet
- ii) Vertically: ± 1.0 foot. Maintain the minimum depth specified.

- c. Greater deviation or interference with other identified facilities may be cause for rejection.
- d. Check line and grade at every grade change and at least every 50 feet.

4. Deviation from Line and Grade:

- a. Provided adequate clearance remains for proper installation of the carrier pipe, the Contractor will be allowed to correct deviations in grade of a casing pipe in order to achieve design grade of the carrier pipe by:
 - (1) Pouring an invert in the casing pipe, or
 - (2) Shimming the carrier pipe with casing spacers to a uniform grade.
- b. The Engineer may reject installations deviating from the specified tolerances that cannot be adjusted to conform to the specified tolerances. If nonconforming installation is not rejected, provide all additional fittings, manholes, or appurtenances needed to accommodate horizontal or vertical misalignment, at no additional cost to the Owner.
- c. Abandon rejected installation and place CLSM materials, at no additional cost to the Owner. Replace abandoned installations, including all additional fittings, manholes, or appurtenances required to replace rejected installations.

C. Casing Pipe & Carrier Pipe Installation:

- 1. Install pipe by approved methods.
- 2. Use a jacking collar, timbers, and other means as necessary to protect the driven end of the pipe from damage.
- 3. Do not exceed the compressive or tensile strength capacity of the pipe during pushing or pulling operations.

4. Bore head shall not extend beyond the casing pipe.
 5. Fully support bore hole at all times to prevent collapse. Insert pipe as soil is removed, or support bore with drilling fluid.
 6. Fully weld all casing pipe joints.
 7. Fill space between the inside of the bore hole and the outside of the pipe with pressure grout mix material if the space is greater than 1 inch.
- D. Carrier Pipe Installation through Casing:
1. Clean dirt and debris from the interior of the casing pipe after installation.
 2. Install casing spacers on carrier pipe sections as necessary to support the pipe barrel according to the pipe manufacturer's recommendations subject to the following minimum requirements:
 - a. Install a spacer within 1 foot of each side of the carrier pipe joint and at a maximum spacing of 6 feet.
 - b. Install restrained joint spacers at pipe joints when using unrestrained joint PVC carrier pipe.
 - c. Do not allow the pipe to be supported by joint bells.
 - d. Lubricate casing spacers with drilling mud or flax soap. Do not use petroleum-based lubricants or oils.
 3. Ensure that thrust loads will not damage carrier pipe joints. Provide thrust collars between joint shoulders of concrete pipe.
 4. Provide timbers for sufficient cushioning between the end of the pipe pushed and the jacking equipment to prevent damage to the pipe. Do not allow the steel jack face to thrust against the unprotected pipe end.
 5. Position jacks so the resulting force is applied evenly to the entire end of the pipe.
 6. Assemble pipe joints in the jacking pit before pushing the carrier pipe into the casing.
 7. Fill annular space between casing pipe and carrier pipe with silica sand material.
 8. Close the end of the casing pipe around the carrier pipe with a casing end seal.

3.04 PIT RESTORATION

- A. Remove installation equipment and unused materials from the launching and receiving pits.
- B. When the carrier pipe extends beyond the limits of trenchless installation and into the bore pit, place bedding and backfill material according to appropriate Specification Section
- C. Place suitable backfill material in the pit. Apply the testing requirements of appropriate Specification Section.
- D. Restore the site to original condition or better.

--END OF SECTION--

SECTION 33 0513

AIR RELIEF MANHOLE

PART 1. GENERAL

- A. SCOPE:
 - 1. This section includes the provision and installation of automatic air relief manholes for the removal of air and gases from the sewer system.
- B. RELATED SECTIONS:
 - 1. Section 31 22 00 aka Site Preparation
 - 2. Section 33 31 00 aka Sanitary Sewer
 - 3. Section 33 32 13 aka Lift Station
- C. REFERENCES
 - 1. ASTM C478 – Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
 - 2. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
 - 3. AWWA C512 – Air Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
- D. SUBMITTALS
 - 1. Submit manufacturer's product data, including installation instructions.
 - 2. Submit shop drawings indicating dimensions, materials, and configuration.
 - 3. Submit certifications indicating compliance with applicable standards.
- E. QUALITY ASSURANCE
 - 1. Manufacturer Qualifications: Manufacturer shall have a minimum of five years' experience in producing automatic air relief valves.
 - 2. Installer Qualifications: Installer shall have a minimum of three years' experience
- F. WARRANTY
 - 1. Provide a manufacturer's warranty covering defects in materials and workmanship for a period of five years from the date of substantial completion.

PART 2. PRODUCTS

- A. PRECAST CONCRETE MANHOLES AND STRUCTURES
 - 1. Precast manholes and structures shall conform to the details shown. Provide cast-in-place concrete bases where shown.
 - 2. Except where otherwise specified precast manhole components shall consist of reinforced concrete sections especially designed for manhole construction and manufactured in accordance with ASTM C 478, except as modified herein.
 - 3. Precast, reinforced concrete manhole bases, riser sections, flat slabs and other components shall be manufactured by wet cast methods only, using forms which

will provide smooth surfaces free from irregularities, honeycombing or other imperfections.

4. A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover.
5. Cover shall be heavy duty, traffic rated, labeled "AIR RELIEF."

B. AUTOMATIC AIR RELIEF VALVE

1. Type: Automatic.
2. Material: Stainless steel or epoxy-coated cast iron.
3. Capacity: Sized appropriately for the manhole and sewer system requirements.

PART 3. EXECUTION

A. INSTALLATION

1. Excavate and prepare site in accordance with Section 31 22 00 – site excavation.
2. Install manhole in accordance with manufacturer's instructions.
3. Install automatic air relief valve as per manufacturer's recommendations.
4. Ensure the valve is accessible for maintenance and inspection.

B. FIELD QUALITY CONTROL

1. Perform inspections to ensure compliance with specifications.
2. Test the automatic air relief valve operation to confirm proper function.

C. ADJUSTING AND CLEANING

1. Clean all debris from the manhole and valve prior to final acceptance.
2. Adjust components as necessary to ensure proper operation.

D. PROTECTION

1. Protect installed manholes and valves from damage during construction activities.

--END OF SECTION--

SECTION 33 0523.13

UTILITY HORIZONTAL DIRECTIONAL DRILLING

A- GENERAL

1. SECTION INCLUDES

The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete directional drilling, testing and other work, as required in these specifications, on the drawings, and as otherwise deemed necessary to complete the work.

2. REFERENCES

- a. Section 31 25 00 – Erosion Control
- b. Section 31 20 00 – Earthmoving
- c. Section 33 11 00 – Water Utility Distribution Piping
- d. Section 33 31 00 – Sanitary Sewers

3. QUALITY ASSURANCE

- a. Provide quality assurance testing for HDPE welding as recommended by the manufacturer.
- b. Pressure Testing:
- c. Conduct tests in accordance with applicable utility specification sections. Allowable leakage for high density polyethylene pipe shall be zero. Testing shall be conducted in the presence of the Engineer.
- d. Tracer Wire Continuity Testing:
- e. Continuity test shall be conducted using an ohmmeter. Resistance on tracer wire shall be no greater than 105% of the specified resistance of the tracer wire. Testing shall be conducted in the presence of the DFD Project Representative unless this requirement is waived. Provide a written report describing equipment used, test methods, and detailed test results. In the event of a failed test, Contractor shall make all necessary repairs required to provide a tracer wire system that complies with the testing requirements of this section.
- f. Provide additional quality assurance testing as required by applicable utility specification sections.

4. SUBMITTALS

- a. Submit shop drawings, catalog data, and manufacturer's technical data showing complete information on resin, pipe and fittings material composition, physical properties, and dimensions of the new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings if damaged. Furnish a certificate of compliance with specified pipe material requirements.
- b. Provide written drilling plan outlining proposed equipment and construction methods, including the following:
 - i. Detailed description of the procedures including construction techniques to provide the access required to install the pipeline
 - ii. Dimensioned drawings of any proposed changes in the pipe alignment or profile

- iii. Literature describing in detail the drilling system to be used, including drill steering and locating system.
- iv. Certification by the machine manufacturer that the drilling equipment has been successful in installing similar size pipe in similar soil and groundwater conditions.
- v. Drawings showing: Layout of boring and receiving locations and associated equipment at each location, grade and alignment control system details, groundwater control provision of drilling equipment.
- vi. Calculations demonstrating that the pipe selected has been designed to support the maximum anticipated earth loads and superimposed live loads, static and dynamic, which may be imposed on the pipe. Determine the additional stresses imposed on the pipe during drilling operations and upgrade the quality and strength of the pipe and pipe joints to the extent necessary.
- vii. Certification from the pipe manufacturer that the pipe and pipe joints are manufactured for drilling installation and conform to current specifications.
- viii. Qualifications and experience record of the drilling superintendent and machine operators.
- ix. Drilling fluid generation and management
- c. Provide a directional drilling contingency plan that accounts for the following:
 - i. Unforeseen obstructions that stop or delay the progress of drilling equipment
 - ii. Deviation from planned line and grade in excess of allowable tolerances
 - iii. Loss of drilling fluid
 - iv. Damage to other utilities
 - v. Soil settlement or heaving
- d. Provide a high density polyethylene (HDPE) fusion welding quality assurance plan.
- e. Provide certifications of training by the polyethylene pipe fusing equipment manufacturer(s) stating that the operators of polyethylene fusion equipment have been fully trained in the use of the fusion equipment used on the project.
- f. Provide written copies of quality assurance test results and reports performed by or for the contractor.
- g. Within 48 hours of completing the pilot hole for each run of pipe, provide the log of the drilling operation and guidance system records documenting the line and grade of that pilot hole to the Engineer. Note the location of any utilities or difficult drilling that was encountered.

B.-MATERIALS

1. **POLYETHYLENE RESIN.** Polyethylene resin used for manufacturing piping and fittings shall meet ASTM D1248 for Type III, Class C, Grade P34, Category 5, with a PPI recommended designation of PE3408 and a minimum cell classification of PE 345434C in accordance with ASTM D3350. The polyethylene compound shall be combined with carbon black to provide protection against degradation by ultraviolet light. Pipe shall be made from virgin material with no rework compound, except that obtained from the manufacturer's own production of the same formulation.
2. **POLYETHYLENE PIPING.** High density polyethylene (HDPE) piping, shall meet the requirements of AWWA C906, current version. Pipe dimensions and workmanship shall be in accordance with ASTM F714 and ASTM D2122. Pipe shall be of diameter shown on the drawings, with a dimension ratio (DR) of DR11, unless otherwise noted.

Pipe, fittings, and joints shall meet or exceed the following physical properties:

<u>PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>VALUE</u>
Density, gm/cc	D1505	0.955
Melt Index, gm/10 min	D1238-E	0.10
High Load Melt Index, gm/10 min	D1238-F	12.0
Tensile Strength @ Break, psi	D638	4,500
Tensile Strength @ Yield, psi	D638	>3,200
Elongation, %	D638	>800
Flexural Modulus, psi	D790	136,000
Environmental Stress Cracking Resistance F ₂₀ ' Hours (100°C)	D1693 (Cond. C)	>5,000
Brittleness Temperature, °F	D746	<-180
Melting Point, °F	D789	261
Vicat Softening Temperature, °F	D1525	255
Hardness, Shore D	D2240	66
Volume Resistivity, ohm-cm	D991	2.6 10 ¹⁶
Recommended Hydrostatic Design Stress:		1600 psi @ 73.4°F 800 psi @ 140°F

3. POLYETHYLENE FITTINGS. HDPE fittings manufactured in accordance with ASTM D2683 (socket fused) or ASTM D3261 (butt fused). Fittings shall be supplied by the HDPE piping manufacturer. Butt fusion outlets shall be made to the same dimensional characteristics and tolerances as the mating pipe. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe. Pressure de-rated fabricated fittings are prohibited.
4. PIPE MARKING. Each length of straight and special pipe and each fitting shall be plainly marked on the outside to identify the design pressure or class of pipe, proper location of the pipe or fitting in the pipeline, and the date of manufacture.
5. TRACER WIRE. Tracer wire shall be #10 stainless steel wire with 45 mil HDPE jacket.
6. DRILLING FLUID ANSI/NSF 60 (Drinking Water Treatment Chemicals – Health Effects) certified bentonite-based drilling fluid.

C - EXECUTION

1. GENERAL
 - a. Comply with the requirements of applicable specification sections for the utility line being installed.
 - b. Conduct any necessary field surveys, subsurface investigations and geotechnical investigations necessary to complete the work.
 - c. Locate all known utilities located adjacent to or crossing the utility line being installed. Excavate to expose utilities prior to initiating drilling and verify applicable clearances. Clearance shall meet applicable code requirements and the requirements of the directional drilling process.
 - d. Locate and verify the clearance of known structures and foundations/footings located adjacent to or crossing the utility line being installed.

2. EXCAVATION, BACKFILL, AND COMPACTION
 - a. Excavate insertion and receiving pits, and other access points as necessary to complete the work.
 - b. Comply with applicable requirements of Section 31 23 16.13, Trenching.
3. HANDLING PIPE
 - a. Storage and handling of polyethylene pipe shall not result in damage to or deformation of the pipe. Protect polyethylene pipe from long-term exposure to temperature fluctuations and sunlight.
 - b. Prepare pipe on a relatively smooth surface, free of sharp rocks, sticks, or debris. Utilize cribbing, pipe stands, rollers, or other equipment as necessary to support the pipe.
 - c. Lift and move piping using ropes, slings, or straps. Do not use unprotected chains, hooks, or clamps to lift pipe.
 - d. When lifting and moving pipe, provide a minimum of two points of support. Do not support pipes at butt-fused joints.
 - e. Sections of pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and rejoined at the Contractor's expense.
 - f. Plug all pipes at end of each workday. Provide a watertight plug to prevent entry of foreign materials into the pipe.
4. DRILLING
 - a. Drilling methods shall generally consist of drilling a pilot hole the length of the bore, followed by reaming and pullback of the pipeline. Ream borehole multiple times, as necessary. The equipment and methods used to complete the bore and install piping shall be determined by the Contractor, but subject to the Contract Documents.
 - b. The drill staging area shall be kept neat and orderly and disturb as little area as possible. The pipe staging area shall disturb as little area as needed to accommodate workers and equipment, and to string, fuse, and inspect the pipe.
 - c. Install all pulleys, rollers, bumpers, alignment control devices and other equipment required to support and protect the new pipe from damage during installation.
 - d. Utilize a drilling fluid cleaning/recycling system. Entry and exit pits shall be sized and constructed to completely contain drilling fluid.
 - e. Install boring to line and grade shown on drawings. Alignment shall be within tolerances specified in applicable utility specification sections.
 - f. Borehole survey instrumentation shall be used to monitor line and grade of the pilot hole. Contractor shall maintain records documenting the line and grade of the pilot hole.
 - g. Contractor shall notify the Engineer upon completion of the pilot hole to observe alignment prior to reaming and pullback.
5. JOINING PIPE
 - a. At start of each day, complete fusion weld tests in accordance with manufacturer's recommendations to verify that fusion equipment is operating properly.
 - b. Polyethylene pipe ends shall be joined using butt fusion methods. Join polyethylene pipe to polyethylene fittings using butt fusion or socket or saddle fusion methods. Fusion methods shall comply with both pipe and fusion equipment manufacturers' requirements and ASTM F2620.

- c. The tensile strength at yield of the butt-fusion joints shall not be less than the pipe. A specimen of pipe cut across the butt-fusion joints shall be tested in accordance with ASTM D638.
 - d. Join polyethylene pipe to mechanical joint or flanged fittings in accordance with both fitting and pipe manufacturers' requirements. Provide HDPE pipe stiffeners, wedge type retainer glands, and clamp type joint restraint system.
 - e. Connect terminal sections of pipe that are joined within excavations with electrofusion couplings. Couplings shall be as manufactured by Central Plastics, Inc., Integrity Fusion Products, Inc., IPEX USA, or equal.
6. REAM AND PULLBACK
- a. Pilot hole shall be back-reamed to accommodate pipe. Contractor shall select the reamer size and number of passes required.
 - b. Pull pipe back using swivel to prevent torsion of pipe.
 - c. Monitor tension forces on pipe during pullback. Do not exceed maximum stresses recommended by the pipe supplier.
 - d. Support pipeline during pullback operations. Provide supports/rollers in accordance with manufacturer's recommendations. Supports and rollers shall allow for free movement of the pipeline and prevent damage to the pipe.
 - e. Use a drilling fluid in conjunction with the installation of the pipe to fill the annular space around the installed pipeline. The Contractor shall be responsible for determining the type of fluid to use, and for properly disposing of all excess drilling fluid and slurry material recovered from the hole during drilling operations and displaced by the pipe during installation.
 - f. Unless otherwise noted on the drawings, terminate and cap carrier pipe 5' above the proposed ground surface.
 - g. Install tracer cable during pullback operations. Extend tracer cable to end of carrier pipe and secure. Test continuity of the tracer cable prior to demobilizing.
 - h. Allow the manufacturer's recommended amount of time for cooling and relaxation due to tensile stressing prior to connecting pipe to adjacent pipe sections, fittings, or structures, or backfilling of the insertion pit. Provide sufficient excess length of new pipe at insertion pits to allow for cooling and relaxation.

--END OF SECTION--

SECTION 33 2200

WATER DISTRIBUTION

A. GENERAL

1. WORK INCLUDED

- a. Connection to existing watermain at location shown on plans.
- b. Trenching and backfilling required for work of this section.
- c. Furnish and install pipe, valves, hydrants, and appurtenances for domestic water supply from the public water main to private connection point near right-of-way.

B. REFERENCES

1. Standard Specifications for Sewer and Water Construction in Wisconsin, 6th Edition, Public Works Industry Improvement Program, 2835 North Mayfair Road, Milwaukee, WI 53227.
2. AWWA - American Water Works Association Standards C104, C110, C111, C151, C153, C502, C515, C600, C651, C900.
3. ASTM B88, F714.

C. PRODUCTS

1. PIPE.

- a. Ductile Iron meeting the requirements of AWWA C115 and AWWA C151. Factory applied terminals with copper straps or cables capable of carrying 600 amps. All pipe shall be minimum AWWA pressure class 150 and shall be designed for a minimum 100 psi working pressure.
- b. PVC pipe, AWWA C900, Class 150, DR-18 with cast iron O.D. Rubber gasketed joints.

2. WATER MAIN FITTINGS.

- a. Ductile Iron pipe fitting shall meet the requirements of AWWA C110, AWWA C153, and ANSI B16.42, and shall include a bituminous coating and cement lining.
- b. PVC joint restraint shall be MEGALUG 2000 PV or equal.

3. GATE VALVES.

- a. Mueller, resilient wedge.
 - i. Gate valves shall meet the requirements of Chapter 8.27.0 of Standard Specifications for Sewer and Water Construction, and AWWA C515.
 - ii. Epoxy lined per AWWA C550.
 - iii. Mechanical joint ends.
 - iv. Provide Adapter, Inc. or approved gate valve adapter.
 - v. Valve shall be set on a solid concrete block with clean gravel as a base for the valve and box.

4. VALVE BOXES

- A. Valve boxes shall be Tyler 6860 DD with No. 69 lid or approved equal, cast iron, 3 piece with screw-type adjustment.
- B. Valve boxes shall have a no tilt drop cover marked "Water" and of the length required for the depth of cover shown on the plans. Valve boxes shall be supported on gate valve adaptors as manufactured by Adapter, Inc. or approved equal.
- C. Cast iron valve boxes shall meet requirements of Chapter 8.29.0 of the Standard Specifications for Sewer and Water Construction. Contractor will furnish extension if required to meet existing surface or finished grades.
- D. Valve box centering device, Adapter, Inc. or equal. Centering devices shall be polyurethane-coated steel with a rubber gasket between the device and the valve.

5. CONCRETE BUTTRESSES

- a. Ready-mixed concrete shall be used.
- b. Concrete shall have following characteristics:

Buttresses

28 day Compressive Strength 2000

Maximum Slump 5"
Air-Entertainment by Volume 4%-7%
Minimum Cement Content 4 bags
Maximum Aggregate 3/4"

6. DETECTABLE PIPE WARNING WIRE (FOR NON-METALLIC PIPE)

- a. 12 gauge wire with 0.015" thick vinyl insulation, insulation color blue.
- b. Moisture, oil, and gasoline resistant.
- c. Splices either solder or brass clamp wrapped with electrical tape or shrink-wrapped.
- d. Exterior access locations shall include a means of protecting the tracer wire.
- e. Tracer wires shall be daylighted at tracer wire signal collection boxes or posts where provided. If signal connection boxes or posts are not specified as a contract bid item, tracer wire shall be made easily accessible every 300 to 400 feet at valves, hydrants, and other locations as required by Owner or Engineer. Daylight tracer wires at pipe stubs, cap with wire nuts, and attach to marker post at least 2 feet above finished grade.

7. HYDRANTS

- a. Mueller, Super Centurion Model A-423 AWWA C502, dry-barrel type, 250 psi rated.
- b. 5 1/4" main valve opening.
- c. 2 hose nozzles (2 1/2") and 1 pumper nozzle (4 1/2"), caps with chains.
- d. Provide 7.0-foot depth of bury.
- e. Mechanical joint inlet connection.
- f. Provide an upper standpipe of minimum 16 inches.
- g. All ferrous materials shall be encased in polyethylene.
- h. High Water Table: In areas where water table is above hydrant base, plug drain hole, install tag which reads –Pump After Each Use–, **note it on record plans**, and notify Engineer in writing.
- i. Hydrants shall be set so traffic flange is 3 to 4 inches above the proposed grade.

8. TAPPING SLEEVE

- A. Carbon steel, epoxy coated, mechanical joint.

9. SERVICE LATERAL

- A. PVC, ASTM D2846 and F442, SDR-9 (C 150)

10. CORPORATION STOPS

- A. Brass Corporation Stop with taper thread inlet and conductive compression outlet. McDonald or Equal.

11. CURB STOPS

- A. Brass curb stop with conductive compression inlet and outlet, quarter turn check, and regular top, McDonald or equal.

12. CURB BOX

- A. Cast iron extension type, Erie pattern with 48" stationary rod, 1 1/4" upper section, 7-foot length, pentagon nut, Minneapolis pattern, McDonald or equal.

13. SERVICE SADDLES

- A. Smith-Blair or Equal. Epoxy-coated ductile iron with stainless steel (double) straps.

14. Bedding and Cover Material

- A. Provide material meeting the requirements of ASTM D2321, Class 1A material.

D. EXECUTION

- 1. EXAMINATION. Before installation, inspect pipe for defects and cracks. Do not use defective, damaged, or unsound pipe.
- 2. INSTALLATION.
 - a. Runs shall be as close as possible to those shown on drawings. The Contractor shall minimize deflections from line and/or grade to the maximum extent practical. The minimum horizontal distance

- from sewer, unless indicated on the drawings for existing connections, shall be 8 feet.
- b. Excavate to required depth.
 - c. Bottom of trenches shall be hard. Tamp as required.
 - d. Remove debris from trench prior to laying of pipe.
 - e. Excavate trenches so the top of pipe will have a minimum cover of 7.0' from the top of pipe to the proposed finished grades.
 - f. Trench shall be backfilled every day. No open trench except at the start of next day's work will be allowed to remain open overnight. Backfill material shall be installed to shed water. Excavations required to be left open overnight shall be enclosed with snow fence. Barricades with flashing lights shall be placed around fence.
 - g. Depth of bury shall be 7.0 feet minimum from existing surface grade to top of pipe.
 - h. Watermain insulation of minimum 2" total thickness by 4' minimum width is required for all installations where depth is less than 6.5 feet.
 - i. Lead valves shall be installed with a minimum of 3' separation from the hydrant.
 - j. Pipe bedding in groundwater areas shall be in clear stone. Hydrant bases shall be provided with clear stone drainage wrapped in geotextile.
 - k. Thrust restraint shall be provided for mechanical joint connections on hydrant leads, 45 degree bends, caps and plugs. Install joint restraints in accordance with the manufacturer's instructions.
3. CONNECTION TO EXISTING SYSTEM.
 - a. Contractor shall coordinate with the Owner upon verification of the existing water main composition, size & layout prior to connecting to the existing main.
 - b. Contractor shall provide and install all adaptors and sleeves necessary to make connection to the water main. A leak-free connection shall be made.
 - c. Conductivity shall be maintained throughout the connection.
 - d. Unless otherwise specified, the connection on new water main to existing main shall meet the requirements of Chapter 4.14.0 of the Standard Specifications for Sewer and Water Construction, the more restrictive shall apply.
 4. GATE VALVE AND VALVE BOX INSTALLATION. Provide sufficient quantities of crushed stone or rock conforming to the requirements of ASTM C33, Gradation No. 2 over and around the valve to prevent sand blockages of valve bonnet and box.
 5. PIPE RESTRAINT. Pipe restraint shall be MegaLug or approved equal mechanical pipe restraint.
 6. BACKFILL.
 - a. Contractor shall backfill and compact all trenches on the same day they are excavated. Trenches in roadway or near proposed construction shall be compacted to 95% of maximum dry density, in uniform lifts of no more than 12 inches non-compacted thickness, in accordance with ASTM D1557 – Method D. Excavated materials shall be utilized from suitable material available within the Village stockpile.
 - b. Contractor shall backfill wet trenches to the groundwater line with suitable self-compacting materials, such as clear stone or clean sand.
 7. SEPARATION FROM SEWER.
 - a. Lay water mains a minimum of 8' from sewer lines (center to center).
 - b. When water mains cross over sewers, provide a minimum of 12 inches from the bottom of the water main to the top of the sewer.
 - c. When water mains cross under sewers, provide a minimum of 18 inches from the top of the water main to the bottom of the sewer.
 - d. Service laterals shall be set (center to center) from sewer laterals a minimum horizontal distance of 30 inches. This separation requirement may be lessened, in the approval of the Engineer, if the vertical separation is at least 12 inches above the sewer lateral.
 8. TRACER WIRE.
 - a. Install warning wire along the length of all non-metallic pipes.
 - b. Tracer wire shall be located directly above and within 6 inches of the non-metallic pipe.
 9. FIELD QUALITY CONTROL.
 - a. Test waterman, including valves, in accordance with Section 4.15.0 of the

- Standard Specifications.
 - b. Flush and disinfect water system in accordance with Section SPS 382.40(8)(i) of the State of Wisconsin Administrative Code.
 - c. Tracer Wire Conductivity:
 - 1. After completion of non-metallic sewer construction, the Contractor shall furnish a locator and using a low voltage circuit, test the entire trace wire system in the presence of the Owner or Engineer.
 - 2. The test shall consist of a continuous above ground trace of the non-metallic sewer system, areas failing the location test shall be corrected at no additional cost to the Owner.
10. BOULDERS OR BEDROCK.
- a. Historic project activity and geologic research does not indicate the presence of bedrock, but if encountered shall be reviewed by the Project Engineer for confirmation of scope and quantity. Excavated trench dimensions where rock is encountered is the outside of the diameter of the pipe plus 24”.
11. DEWATERING.
- a. Dewatering is not anticipated on this project. However, it is the Contractor’s responsibility to retain all required dewatering permits if necessary. Clear stone bedding will be required for wet trench installations.
12. INSULATION.
- a. Watermain shall be insulated where noted on the plans and wherever the depth of cover is less than 7.5 feet. Prior to placement of these polystyrene boards, bedding material shall be placed to a height of 6-inches over the top of the pipe, leveled and compacted. The laying width shall be either 4-feet as shown on the plan and details.
13. AS-BUILT MEASUREMENTS.
- a. Provide as-built measurements clearly marked on a clean copy of the Construction Drawings, including the distance between valves, tees and bends, ties to known and established surface features, distance to laterals, lateral horizontal deflections, distance to significant vertical deflections, and overall length of service laterals and mains installed.
14. DISINFECTION OF MAINS.
- a. Method: Use Calcium Hypochlorite Tablet Method in accordance with requirements of AWWA C651.
 - 1. One pound of commercial (70%) Calcium Hypochlorite to 1,680 gallons of water may be used in lieu of tablets.
 - 2. Section being tested shall be isolated from remainder of system.
 - b. Flushing
 - 1. Disposing of chlorinated water flushed from mains shall flow into sanitary sewers. Discharge to trout streams, or lakes will not be allowed unless water is dechlorinated prior to discharge and discharge is approved by WDNR.
 - 2. Discharge into Owner’s sanitary sewer system after dechlorination must have Owner’s approval.
 - c. Testing
 - 1. One sample will be required to test for presence coliform bacteria for every 1,200 feet of new water main, at end of lines, and at each branch.
 - 2. Contractor shall provide sampling tap and collect samples.
 - 3. Contractor will be responsible for cost of testing.
 - 4. Contractor shall provide results of tests prior to making service connections.
 - 5. The Contractor shall provide a bacteriologically safe sample in accordance with AWWA C651 before the main is placed into service. Additional safe samples may be obtained at the request of the engineer, a minimum of 24-hours apart.
15. ELECTRICAL CONDUCTIVITY TEST
- a. Timing:
 - 1. Perform conductivity test including pipeline, valves, fittings, and hydrants within one week after completion of pressure testing of all ductile iron pipe water mains to establish that

electrical thawing may be carried out in future.

2. Electrical test shall be made after backfilling and successful hydrostatic pressure test completion and while line is at normal operating pressure.
- b. Procedure:
 1. Test for electrical continuity and current capacity.
 2. Testing system sections of convenient length will be allowed if approved by Engineer.
 3. Cables from power source to section of system under test should be of sufficient size to carry test current without overheating or excessive voltage drop. Sizes should be in range of 2/0 to 4/0 .W.G.
 4. Sources of D.C. for tests shall be arc welding machines. All such equipment shall be furnished by Contractor, subject to approval of Engineer.
 5. When using arc welding machines, current control should be set at minimum before starting. After starting the machines, advance control until current indicated on ammeter is at desired test value. Caution: In case of open circuits at joints or connections, voltage across defective joint or connection will be between 50-100 volts.
 6. Connections for test shall be made at hydrants. Hydrants shall be in open position with caps on during test. Cable shall be clamped to body of hydrant and not unto top nut. Note: After test, hydrant shall be shut off and cap loosened to allow hydrant drainage. Tighten cap after drainage.
 7. Use hook-on type D.C. ammeter placed on one of cables leading to hydrant to measure current.
 8. Pass direct current of 350 amperes, $\pm 10\%$, through the pipeline for 2 minutes. Current flow through pipe shall be measured continuously on suitable ammeter and shall remain steady without interruption or excessive fluctuation throughout 2 minute test period.
 9. Insufficient current, intermittent current, or arcing that is indicated by large fluctuation of ammeter needle shall be evidence of defective contact in pipeline. Contractor shall isolate cause and correct it. Section in which defective test occurred shall be retested as unit and shall meet requirements.

16. HYDROSTATIC TESTS

- a. Leakage Test:
 1. Specified test pressure is 150 psi and time of test is one hour.
 2. Perform leakage test on all pipe as soon as possible after installation. Contractor shall furnish all equipment and labor for test.
 3. Definition: Leakage shall be defined as quantity of water that must be supplied into newly laid pipe, or any valved section thereof, to maintain pressure of 145 psi after air in pipeline has been expelled and pipe has been filled with water.
 4. Allowable leakage:
 - Leakage shall not be greater than calculated by following equation:
$$L = \frac{SD\sqrt{P}}{148,000}$$
 - Where L = allowable leakage, in gallons per hour; S = length of pipeline tested; D = nominal diameter of pipe, in inches, and P = average test pressure during leakage test in psi.
 5. If any test of pipe laid discloses leakage greater than allowed by formula, then Contractor shall, at his own expense, locate and repair defective material until leakage is within specified allowance. Any visible leaks shall be repaired regardless of amount of leakage.
 6. Pressure Testing Against Existing Valves:
 - Should the pressure test fail when pressure testing against an existing valve, the Contractor shall investigate all possible sources of leaking. The Engineer and/or Owner shall then make a determination whether or not the existing valve should be replaced.
 - After the replacement of the valve, a pressure leak test shall be completed. If the pressure leak test fails with the new valve installed, the Contractor shall further investigate the possible source of leaking and correct the leak. No compensation shall be made to the Contractor for removal and replacement of existing valve and box if the existing valve was not the cause of the leak.

- If the pressure leak test passes due to the replacement of the existing valve, the Contractor shall be compensated for removal of the existing valve and installation of the new valve and box in accordance with the applicable contract bid item(s); or by change order if no bid items are provided.

--END OF SECTION--

SECTION 33 3100

SANITARY SEWER SYSTEMS

A. GENERAL

1. WORK INCLUDED
 - a. Connection to existing Sanitary Sewer Main.
 - b. Trenching, backfilling & bedding required for work of this section.
 - c. Furnish and install piping for sanitary sewer mains.
 - d. Furnish and install sanitary lateral services, appurtenances.
 - e. Make live connections and backfill and restore.
2. REFERENCES
 - a. Standard Specifications for Sewer and Water Construction in Wisconsin, 6th Edition, Public Works Industry Improvement Program, 2835 North Mayfair Road, Milwaukee, WI 53227.
 - b. AWWA - American Water Works Association Standards.
 - c. ASTM A48, C94, C270, C478, 877, C923, C990, D1785, D2665, D3034, & D3212.
 - d. AASHTO M198.

B. PRODUCTS

1. SANITARY SEWER MAIN PIPE
 - a. Polyvinyl Chloride Pipe (PVC), SDR-35 PVC, meeting the requirements of ASTM D3034, and push-on joints with elastomeric gaskets meeting the requirements of ASTM D3212. Do not mix different manufacturer's products, or fittings.
2. PVC SEWER PIPE BEDDING
 - a. PVC sewer pipe bedding shall meet requirements of ASTM D2321, Class IA, IB, II or III material.
 - b. Bedding in groundwater shall be with clear stone.
3. SERVICE LATERALS
 - a. PVC, ASTM 3034, SDR-35, ASTM D2665 or ASTM D1785, Schedule 40, Elastomeric Joints.
 - b. Service laterals shall include wye fittings (6") at the main connection. Use appropriate reducers in the event a 4" lateral has been confirmed.
4. TRACER WIRE
 - a. 12-gauge wire with 0.015 inch thick vinyl insulation, insulation color green.
 - b. Moisture, oil and gasoline resistant.
 - c. Splices either solder or brass clamp wrapped with electrical tape or shrink-wrapped.
 - d. Exterior access locations shall include a means of protecting the tracer wire.
 - e. Tracer wires shall be connected securely to tracer wire signal connection posts or boxes where provided. If signal connection boxes or posts are not specified as a contract bid item, tracer access wire shall be made easily accessible at other locations as required by Owner or Engineer.
 - f. Install tracer wire signal connection posts and boxes per manufacturer's instructions.
5. PIPE INSULATION
 - a. Rigid closed-cell extruded polystyrene insulation suitable for buried insulation.
 - b. Insulation shall have a minimum thickness of 2 inches.
 - c. Insulation shall be installed as directed by the Engineer or Owner.
6. SANITARY SEWER MANHOLES
 - a. Manholes castings shall be R-1550 with non-rocking feature and concealed pickholes.
 - b. Manholes shall be precast concrete subject to shop drawing review for verification of products, inverts, and general configuration in the field.
7. BACKFILL

- a. Contractor shall backfill and compact all trenches on the same day they are excavated. Trenches in roadway or near proposed construction shall be compacted to 95% of maximum dry density, in uniform lifts of no more than 12 inches non-compacted thickness, in accordance with ASTM D1557 – Method D. Excavated materials shall be utilized for backfill unless otherwise directed by the Project Engineer.
- b. Contractor shall backfill wet trenches to the groundwater line with suitable self-compacting materials, such as clear stone or clean sand.

C. EXECUTION

1. EXAMINATION
 - a. PVC pipe and installation means shall meet requirements of Chapter 3.2.0 of Standard Specifications for Sewer and Water Construction.
2. TRACER WIRE
 - a. Install warning wire along the length of all non-metallic pipes.
 - b. Tracer wire shall be located directly above and within 6 inches of the non-metallic pipe.
3. SEPARATION FROM WATER MAIN
 - a. Sanitary sewer mains shall be placed at least 8 feet horizontally (center to center) from any existing or proposed water main. If, due to ledge rock conditions or physical barriers, the Project Engineer determines that the 8-foot horizontal separation cannot be maintained, the horizontal separation may be reduced to a minimum of 3 feet if the bottom of the water main is at least 18 inches above the top of the sewer.
 - b. When sanitary sewer mains cross under water mains, provide a minimum separation of 12 inches from the bottom of the water main to the top of the sewer. When sanitary sewer mains cross over water mains, provide a minimum of 18 inches from the bottom of the sewer to the top of the water main.
4. SERVICE LATERALS
 - a. Service laterals shall be laid at a minimum slope of 1/8" per foot and a maximum slope of 1/2" per foot. Risers laid at 45 degrees shall be used to keep the pipe within the maximum slope limit.
 - b. Sewer lateral and water lateral separation. Sewer service laterals shall be set (center to center) from water laterals a minimum horizontal distance of 30 inches. This separation requirement may be lessened, in the approval of the Engineer, if the vertical separation of the water lateral is at least 12 inches above the sewer lateral
5. SEWER MANHOLES
 - a. Quality Control & Special Provisions
 1. Manholes shall be provided with minimal fractures or cracks. Any cracks passing through the manhole wall is cause for rejection.
 2. The manhole surface, both interior and exterior, shall be free from surface defects such as bulges, honeycombing or open texture that would affect structure integrity or functionality of the manhole.
 3. Alignment shall be as designed and provided in the shop drawings.
 4. Manhole base shall be set on a minimum of 6" of crushed stone bed.
 5. Damage to vertical joint sections shall be inspected by the Engineer prior to installation.
 6. Lift holes shall not extend 100 percent through the thickness of the wall.
 7. Each manhole shall be provided with 0.1 feet of vertical drop across the manhole, any obstructions or impairments to the flowline shall be corrected or the manhole bottom section replaced at the direction of the Engineer.
 8. Manholes shall be 48" inside diameter with an eccentric cone top with a 24 inch opening.
 9. Manholes shall be provided with exterior chimney seal waterproofing (Cretex or Equal), also subject to shop drawing review.
 10. Manholes shall be provided with steps (1/2" diameter grade 60 steel rod). Steps shall be co-polypropylene plastic encapsulated steel reinforcing rod as

manufactured by M.A. Industries, or equal, and integrally cast into manhole above outgoing pipe. Spacing shall be no more than 16" on center.

11. Pipe connections shall be flexible rubber gasket, Kor-n-seal or equal.

12. Joint sealant shall be pre-formed, butyl rubber, Kent Seal or equal.

13. Provide 4-6" of adjusting rings. Set frames and rings on full beds of mortar, ASTM C270, Type M.

6. AS-BUILT PLAN

- a. Contractor shall provide an "As-Built" plan with all measurements to the nearest 0.01 foot at no cost to the Owner or Engineer.

7. FIELD QUALITY CONTROL

a. Testing and Inspection:

1. Sanitary sewer installation shall be inspected by the Project Engineer and/or Village Engineer.
2. Infiltration/exfiltration testing shall be by Low Pressure Air at no extra cost to the Owner. Low pressure air testing shall be conducted at a nominal pressure of 5.0 psi and no lower than 3.5 psi if above groundwater. Pressure drops of more than 1 psi per line tested shall be grounds for failure. The minimum testing time shall be 7.34 seconds for each line tested within the project.
3. Deflection testing shall be performed on mainline PVC sewers. The test will be performed with a rigid ball or mandrel of 5% allowance (7.28" diameter) without mechanical pulling. The test shall be conducted within 30 days of backfilling. Any sewer line not passing shall be replaced and re-tested.
4. Tracer Wire Conductivity:
 - a. After completion of non-metallic sewer construction, the Contractor shall furnish a locator and using a low voltage circuit, test the entire trace wire system in the presence of the Engineer.
 - b. The test shall consist of a continuous above ground trace of the non-metallic sewer system, areas failing the location test shall be corrected at no additional cost to the Owner.

8. BOULDERS OR BEDROCK

- a. If encountered, boulders or bedrock shall be reviewed by the Project Engineer for confirmation of scope and quantity. Excavated trench dimensions where rock is encountered is the outside of the diameter of the pipe plus 24".

9. DEWATERING

- a. Dewatering may be required for this project. It is the Contractor's responsibility to retain all required dewatering permits if necessary. Clear stone bedding will be required for wet trench installations.

10. SEWER CLEANING.

- a. None Required unless, upon the direction of the Project Engineer, the sewer has accumulated silt or construction debris to an extent that cleaning is required prior to acceptance.

D. MEASUREMENT & PAYMENT

1. SEWER MANHOLES

- a. This item shall be paid for acceptable work by the vertical foot of installed manhole, from the flowline of the sewer main to the top rim of the installed casting. Castings may require final adjustment by the utility contractor according to the final sidewalk grades.

2. SANITARY SEWER PIPE

- b. This item shall be paid for acceptable work by the actual pipe installed from installed manhole rubber boot to installed manhole rubber boot (or stub end). Tracer wire, testing, bedding and backfill are considered incidental to this item.

3. SANITARY SEWER LATERAL

- c. This item shall be paid for acceptable work by the actual pipe installed from installed

manhole rubber boot or installed sewer main to the plugged end of the lateral or connecting point. Installed wyes, bends, cleanouts, tracer wire and risers are considered incidental within this item along with common bedding, backfill & testing.

--END OF SECTION--

SECTION 33 3110

MANHOLE AND INLETS

PART 1. - DESCRIPTION

A. THIS WORK CONSISTS OF CONSTRUCTING, RECONSTRUCTING, RELOCATING OR ADJUSTING MANHOLES AND INLETS.

B. MATERIALS

- 1.1 Use materials that conform to the following:
 - A. Precast Concrete Units
 - B. Flexible Watertight Gaskets
 - C. Frames, Grates, Covers, & Ladder Rungs

PART 2. - CONSTRUCTION REQUIREMENTS

A. NEW CONSTRUCTION

- 1.1 Construct concrete manholes and inlets to conform to the requirements of Standard Specification for Highway and Structure WDOT, current addition and the details shown on the Plans.
- 1.2 Construct masonry manholes and inlets to conform to the requirements for the respective type and the details shown on the Plans.
- 1.3 Use full mortar joints no more than 1/2 inch wide.
- 1.4 Set metal frames in full mortar bed.
- 1.5 When specified, plaster the outside face of structures with a 1/2-inch-thick cement-sand mortar coat.
- 1.6 Cure exposed surfaces of concrete and masonry with wet burlap for at least 48 hours.
- 1.7 Fit each pipe section flush on the inside of the structure wall and to project far enough outside to connect properly with the next pipe section.
- 1.8 Fit masonry neatly and tightly around the pipe.
- 1.9 Construct invert channels in all manholes used for sanitary or combined sanitary and storm sewers. Construct channels to be smooth and semicircular to conform to the inside of the adjacent sewer sections. Make changes in flow direction along a smooth curve with as large a radius as the manhole size permits. Make gradual and even changes in channel size and grade.
- 1.10 Form invert channels by using any of the following methods:
 - A. Directly in manhole concrete base.
 - B. Built up with brick and mortar.
 - C. Laying half tile in concrete.
 - D. Breaking out the top one-half of full sections of pipe, laid through the manhole, after the surrounding concrete has hardened.
- 1.11 Construct smooth floor outside the invert channel so that it slopes towards the channel not less than 1 or more than 2 inches per foot.
- 1.12 Adjust existing manhole or inlet by raising or lowering the frame or ring casting 12 inches or less, without reconstructing the cone section.

B. RECONSTRUCT MANHOLE

- 1.13 Reconstruct existing manhole by using one or more of the following methods:
 - A. Bring the manhole frame and cover to grade if you remove the cone for lowering.
 - B. Raise the manhole frame and cover more than 12 inches.
 - C. Reconstruct a portion of the manhole with no change in line or grade.
 - D. Tap one or more additional pipes into an existing manhole.
 - E. Move the manhole cone out of the wheel path or curb line. Rotate the cone to align the manhole or inlet casting if necessary. Align the access stairs by rotating the barrel sections or install new steps.
- 1.14 Reconstruct the manhole to the required elevation so that it conforms to plan details. Complete this work according to the requirements for new construction. Reuse material only if the Engineer approves.

C. MANHOLE AND INLET ALIGNMENT

- 1.1 Align manholes designed to fall within the paved roadway surface so that the casting is not in the driving lane wheel path or in the gutter pan flow line.
- 1.2 In roadways, set the manhole frame and cover flush with or no more than 3/8 inch below the finished pavement surface. In walkways and bike paths, set the manhole frame flush with the surface.
- 1.3 Do not impede existing sewer flow during construction.
- 1.4 Relocate inlet by removing and reinstalling inlet box, frame, and grate at new location.
- 1.5 Relocate manhole by removing and reinstalling manhole barrel, cone, frame, and cover at new location.

PART 3. - METHOD OF MEASUREMENT

- A. By the unit completed and accepted in final position.

PART 4. - BASIS OF PAYMENT

- A. At the contract price, per unit of measurement, for each of the pay items shown in the bid schedule.
- B. Excavation and backfill is incidental to the manhole construction.

--END OF SECTION--

SECTION 33 3123
LIFT STATION PIPING

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A Piping for lift station wet well and valve vault, as shown on the Drawings.

1.02 REFERENCES

- A ANSI A21.10, AWWA C110 - Ductile Iron Fittings 3 in. through 48 in., for water and other liquid.
- B ANSI B36, AWWA 312 - Stainless Steel Pipe.
- C AWWA C151 - Ductile Iron Pipe, centrifugally cast in metal molds or sand-lined molds for water or other liquids.
- D ANSI A21.15, AWWA C115 - Flanged Ductile Iron Pipe with Threaded Flanges.
- E ANSI B16.1 Ductile Iron Pipe Flanges and Flanged Fittings.
- F AWWA C111, ANSI A21.11 - Rubber Gasket Joints.
- G AWWA C600 - Hydrostatic Testing.
- H ASTM A194 - Carbon and Alloy-Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

1.03 SUBMITTALS

- A Submit detailed drawings on pipe, joints, gaskets, fittings, flange coupling adapters, and appurtenances.
- B Submit shop drawings indicating dimensions, layout of piping, elevations, intersections, connections, support system, etc.
- C Submit manufacturer's Certification of Compliance with ANSI, AWWA and other Standards listed herein.
- D Submit description of proposed testing methods, procedures and apparatus and test reports for each system.

1.04 QUALITY ASSURANCE

A Manufacturer's Qualifications

1. Piping and appurtenances provided under this Section shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service for at least 5 years.
2. Insofar as possible all piping and appurtenances of the same specific type shall be the product of one (1) manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A Have products delivered, stored and protected under provisions of Section 01600 Material and Equipment.

PART 2 PRODUCTS

1.01 MATERIALS

A Ductile Iron Pipe: AWWA C151, Class 53 minimum.

1. Fittings: AWWA C110
2. Joints: Smooth faced ductile iron flanges, AWWA C115 drilled for NASI BIG.1, Class 125 dimension, with threaded flanges and 1/8" thick rubber gaskets.
3. Bolts, studs and nuts: ASTM A-316 stainless steel.
4. Flanges: Same material as pipe and screwed onto the pipe in accordance with ANSI B16.1. Use screwed-on flanges attached to the pipe by the pipe manufacturer or pipe manufacturer's authorized fabricator.
5. After flange attachment, have flange and pipe re-faced so that the end of the pipe is even with the face of the flange and both are perpendicular to the axis of the pipe.
6. All flanged joints shall be hydrostatically tested after fabrication to a pressure rating of 300 psi minimum. All flanged joints shall be marked (Tested at 300 psi) and notarized certification papers supplied to the purchaser.
7. Align bolt holes on both flanges at the end of each piece of pipe.
8. Where cap screws or stud bolts are required, incorporate tapped holes for such cap screws or stud bolts in the flanges.

9. Exterior Coating: Coat pipe with Polyurethane Coatings on Steel or Ductile Iron Pipe. See Table following.

All piping in wet well to be sand blasted and painted according to this Paint Schedule. Color: RED	Subsurface Wet Service Metals
	Surface Preparation: SSPC-SP-5 White Metal Blast 1st Coat: Amercoat 395 Epoxy*; 5-6 mils. 2nd Coat: Amercoat 395 Epoxy*; 5-6 mils. 3rd Coat: Amercoat 395 Epoxy*; 5-6 mils

* or approved equal

10. Performance: Use pipes and fittings designed for an internal working pressure range of -10 to +150 psi.
- B Wall Pipes: Ductile iron flanged with water stop collar.
1. Ductile iron water stop collar to be welded on the wall pipe prior to installation of the interior lining. (NOT REQUIRED THIS PROJECT)
 2. Interior Lining: As specified for pipe in paragraph 2.01A.9.
 3. Bolts, studs and nuts: Type 316 stainless steel.
- C Flanged Coupling Adapter if needed:
1. Type: Ductile iron; Romac Industries, Style FCA501, Dresser Style 128, or approved equal.
 2. Bolts, studs and nuts: Type 316 stainless steel.
- D Air Release Piping if needed: Schedule 40, ANSI B36 stainless steel with ANSI B1.20.1 threaded joints.
- E Stainless Steel Quick Connect:
1. Type: Stainless Steel, Kuriyama 4", threaded to male fitting, or approved equal.
 2. Provide Matching Stainless Steel Cap

EXECUTION

1.02 INSTALLATION

- A Check dimensions shown on the Drawings prior to installation of Work. Notify the Owner's Representative promptly of any conflicts or errors.
- B Run pipe lines straight and true in alignment, grade and location as shown on the Drawings.
- C Install piping through walls and floors as shown on the Drawings.

1.03 PIPE IDENTIFICATION LABELS

- A Label piping as follows:
1. Identify all piping with plastic sleeve snap-on markers with 3/4-inch letters on pipe sizes to 4-inch and 2-inch letters on pipe sizes 5-inches and larger, or approved equal.
 2. Locate (within the AGVV) at each valve, each branch take-off, and at each side of floor or wall through which pipe passes.
 3. Not more than one label is required every 12 feet if adjacent label is visible.
 4. Place labels on all lines within the AGVV.

1.04 TESTING

- A Flush pipes clean. Tighten connections to stop any visible leaks.
- B Test piping in accordance with Section 4-Hydrostatic Testing, AWWA C600.
- C Test piping to a pressure of 150 percent of the maximum possible discharge pressure of the pumps.

--END OF SECTION--

SECTION 33 3125

SANITARY SEWER FORCEMAIN PIPING

A. DESCRIPTION

The CONTRACTOR shall furnish all materials and do all work necessary to construct complete the force main as shown on the plans and as specified.

B. WORK INCLUDED

The work under this item includes all materials, work, and operations necessary to construct complete the forcemain of the size and type specified. That is: all pipe of the required size, fittings, bends, joint materials, installation of pipe and fittings, concrete blocking as required or shown on the plans, clearing and grubbing, earth excavation, pavement removal, existing force main removal, sheeting and shoring, protection of trees and existing structures, dewatering, disposal of excess excavated materials, backfilling, maintaining trench surfaces, aggregate base, restoration of signs, mailboxes, fences, posts, gravel and stone driveways, pillars, culverts, etc, testing, cleanup and all other operations necessary to complete the work as shown on the plans or as specified. The CONTRACTOR should note that this item shall be installed using conventional open cut trench methods. The CONTRACTOR shall make all connections to existing force main as shown on the plans and shall do all cutting, fitting and/or patching of the existing pipe that may be necessary to perform the new work to make the parts fit together as shown or reasonably implied for the proper functioning and operation of the system, as a part of the respective sewer items.

C. LAYING OF FORCE MAIN

a. GENERAL

The location of the force main may be shifted during the course of construction by the ENGINEER to avoid interference with trees, shrubs and existing utilities whose exact location are not known. Nonadditional compensation will be allowed for the shifting of the force main to avoid such interference. In general, the CONTRACTOR shall locate all existing utilities prior to the start of construction. Provide 5'-0" minimum cover over all force main. The CONTRACTOR shall install the force main at the approximate grades and depths and with the high points and low points at the locations as shown on the plans, taking care to assure that no additional high points or low points are added which may affect the operation of the force main and/or lift station.

b. OPEN CUT METHOD

When using the conventional open cut method, the force main under this item shall be installed using the same procedures and workmanship as described under "Laying of Pipe" in the specification for sanitary sewer. All bends shall be provided with concrete blocking between the pipe and undisturbed ground as a part of this item. The direction of laying the pipe shall be at the CONTRACTOR'S option.

c. PIPE MATERIALS

Pipe materials for the force main installed using the open cut method shall be C-900 Dr 18" pipe meeting the thickness requirement of awwa c900-07 & FM 1612 Pressure Class of 235 psi and standard laying length of 20 ft and ANSI A21.50 for Class 50 Ductile Iron with internal epoxy coating or Picketing the requirement of ASTM D2241 with an SDR of 21, rated at a working pressure of 200 PSI.

Fittings shall be mechanical joint fittings with body thickness and radii of curvature conforming to ANSI Standard A21.10, and joints in accordance with Section 11 - 2.3 of ANSI Standard A21.11, Class 250 gray iron.

d. MEASUREMENT AND PAYMENT

The actual number of linear feet of force main, constructed as shown on the plans, as specified, or as ordered by the ENGINEER, measured along the centerline of the pipe at grade, will be measured for payment as force main. The beginning point for measurement at the lift station will be the outlet from the gate valve, furnished with the lift station. The end point shall be the connection to the existing system. No extra compensation will be made for landscape and restoration of any kind.

The actual number of bends which are installed at the locations shown on the plans or ordered by the ENGINEER, will be counted for payment under their respective pay items.

Pay Item	Pay Unit
8" Forcemain, PVC	LFT

--END OF SECTION--

SECTION 33 3213

SUBMERSIBLE LIFT STATION

PART 1. DESCRIPTION

- A. The CONTRACTOR shall furnish all materials and do all work necessary to furnish and install complete and ready for operation the lift station together with all appurtenant items and structures as shown on the plans and as specified. The station shall be complete with all equipment assembled on a fiberglass coated baseplate and protected from the environment by a fiberglass enclosure. The pump station shall be provided by B&M Technical Services, Inc.. The naming of a manufacturer of equipment in this specification is not intended to eliminate competition or prohibit qualified manufacturers from offering equipment. Rather, the intent is to establish a standard of excellence for the material used, and to indicate a principle of operation desired. The contractors' bid shall be based on the use Shinmaywa product. Unless the bidder clearly indicates in his bid that he is offering an equal product approved by the engineer via a pre bid submittal, his bid shall be considered as providing the brand name product referenced in the specifications above.
- B. The contractor is hereby notified that responsibility for the complete and satisfactory operation or function of all equipment and materials, is definitely a part of this contract, regardless of the manufacturer's guarantee on any item furnished. It is the contractor's responsibility to place all equipment in operation, furnish all lubrication, packing and other accessories necessary for initial operation, and to see that proper operating and maintenance instructions are prepared and followed.

PART 2. WORK INCLUDED

- A. The work included under this item includes the furnishing and installation of a complete automatic underground lift station with all equipment, structures, interconnecting piping, bollards, electrical work, and appurtenances from the inlet sewer of the wet well to the existing gate valve and box, as shown on the plans and as specified.
- B. This lift station shall consist of submersible pumps installed within a concrete wet well, including all required piping and a liquid level control system.
- C. Included under this item shall be all earth excavation, backfill, grading, sheeting, shoring, required dewatering operations, disposal of excess excavated materials, disposal of water, all masonry, site gravel, site work, landscaping, electrical, and all other material and operations necessary to install the lift station, as shown on the plans and as specified, complete and ready for operation except work which is specifically included under other contract items.
- D. As a part of this work, the CONTRACTOR shall remove valve vaults, abandon the existing wet wells as shown on the plans and as herein specified. Also included shall be the connection to the existing and new force main and gravity sewer as shown on the plans.
- E. A new wet well structure shall be installed. The CONTRACTOR shall be responsible for producing a fully functional, submersible-pump lift station.

- F. The new wet well shall be 8-foot in diameter and shall be constructed of precast concrete in accordance with the ASTM Specifications for "Precast Reinforced Concrete Manhole Risers and Tops", designation C-478. The minimum wall thickness shall be five (5) inches. Precast flat covers and flat bottoms shall be a minimum of 8-inches thick reinforced with two layers of steel with a minimum area of 0.39 square inches per linear foot in both directions in each layer. Each section shall contain standard manhole steps. Vertical manhole joints shall be of the "O" ring type. Drawings of the wet well must be submitted to the ENGINEER for approval prior to construction.
- G. The CONTRACTOR shall furnish and install the pump guide base mounting hardware, the pump upper guide rail brackets and guide rails, the level control system and mounting hardware, the submersible pumps, and all other items as shown on the plans and as required for a complete and operable submersible lift station.

PART 3. DISCHARGE PIPING

- A. The submersible pumps, guide rails, guide brackets, discharge quick connect elbow, lifting chain, discharge risers, float brackets and associated equipment by B&M Technical Services.
- B. The piping shall be C900 DR18.
- C. The pump station shall be equipped with a 1 1/4" manual air release / recirculation line. The air release valve shall not only provide air release for the pumps but shall also provide wet well agitation while the pumps are on operation. This wet well agitation will help keep grease and other solids from building up on the level control equipment, wet well walls and wet well floor. Automatic air release valves that are normally prone to plugging and require high maintenance will not be accepted.
- D. This system shall incorporate a 1 1/4" gate valve to allow air to escape from the pump casing back into the wet well. After initial adjustment, this system shall require no maintenance.

PART 4. SUBMERSIBLE PUMPS

- A. Each sewage pump shall be capable of delivering 315 gallons per minute of unscreened raw wastewater against a total dynamic head of 15 feet. Each pump shall have a maximum speed of 1750 R.P.M. and the minimum rated horsepower of each motor shall be 7.5. All openings and passages shall be large enough to permit passage of a 3 inch diameter sphere and any trash or stringy material which can pass through a 4" diameter collection system. ShinMaywa 4CNXH411T2E2 Pump provided by B&M Technical Services, Inc. or approved equal.
- B. Furnish and install solids handling submersible sewage pumps rated for use in Class 1, Division 1, Group D locations. The pump motor shall be an integral part of the unit. The pump shall be supplied with a cast iron guide rail base fitted with a discharge elbow. Each unit shall be fitted with a sufficient length of stainless steel lifting chain of adequate strength to permit raising and lowering of the pump. Each pump motor shall be equipped with the required length of combination power and control cable sized in accordance with NEC and ICEA standards. The cable shall have P-MSHA approval or FM approval for use in Class 1, Division 1, Group C & D locations.
- C. Each pump shall be of the sealed submersible type as manufactured by ShinMaywa Industries and be capable of pumping municipal sewage with spherical solids up to three inches (3") in diameter. The pump, volute, motor, and seal housing shall be of high

quality, ASTM A48, Class 30, gray cast iron. Casting shall have smooth surfaces devoid of blowholes or other casting irregularities. The pump discharge shall be fitted with a four-inch (4") standard ANSI 125# flange, faced and drilled. All external mating parts shall be machined and Buna N rubber o-ring sealed on a beveled edge. Machining and fitting shall be such that sealing is accomplished by automatic compression of o-rings in two plans and o-ring contact is made on four surfaces without the requirement of specific torque limits. Flat faces and gaskets shall not be acceptable. All fasteners exposed to the pump's liquids shall be of 304 series stainless steel.

- D. The pump volute shall have smooth internal surfaces free from rough spots, gas holes, or flashing; shall be one-piece, circular design; and shall have a four-inch (4") flanged discharge. Scroll-type volute designs that tend to unbalance from wear resulting in shaft stress shall not be considered equal or acceptable. A volute casing wear ring shall be provided to minimize impeller wear. The wear ring shall be bronze and shall be easily replaceable in the field.
- E. A single vane, non-clog, scroll impeller shall have scroll formed passage at its suction area and smoothly connected to single vane non-clog passage. The impeller shall have high pass-through capability with high-hydraulic efficiency and eliminate clogging, plugging, and entangling of fibrous obstacles with hydraulic efficiency, thus, reducing maintenance cost and operating cost. Impeller shall be statically and dynamically balanced. A wear ring of stainless steel shall be provided.
- F. An upper radial bearing and lower thrust bearing shall be required in the motor. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be two ball bearings, designed for a long life [at least 100,000 hours (L10 at B.E.P. calculated)]. Bearings shall be locally available.
- G. Rotor bars and short circuit rings shall be manufactured of cast aluminum. Motor Shaft shall be made from JIS420 J2. The pump shaft shall rotated on two bearing. Motor service factor shall be 1.15. Motor capable 20 starts per hour. The motor shall be designed for operation up to 104 oF (40 oC) ambient and with a temperature rise not to exceed 70 degree. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be non-overloading the entire specified range of operation. Motor over temperature protection shall be provided by miniature thermal protectors embedded on each winding. Leakage probe detector is provided for mechanical seal failure protection located in seal failure chamber. Mechanical seals must be locally available and nonproprietary.
- H. Power cable jacket shall be made of an oil resistant PVC material, designed for submerged applications. Standard power cable length is 50 feet. Cable entry of submersible motor shall prevent incursion of the pumpage into the motor due to the phenomena knows as "WICKING", a portion of each conductor is stripped back exposing the copper conductor. The cable is placed in a mold and is molded into one piece. The mold rubber seals the end of the power cable and flows in between each strand of conductor. This feature prevents "WICKING", through the fiber reinforcement found in standard submersible cable, and through the strands of the conductor itself.
- I. The contractor shall provide explosion-proof seals, silicon seals, and a junction box between the control panel and the lift station wet well for the pump power cords and float control cords. All seals and the junction box must conform to the requirements of the National Electric Code.
- J. Finishes
 - 1. The pump shall be painted after assembly, but before testing, with an alkyd resin primer with an epoxy finish coat. The paint shall be applied in one coat with a minimum thickness of three (3) to four (4) mils.

K. Testing

1. The pumps shall be tested at the manufacturer's plant before shipment in accordance with Hydraulic Institute Standards. Certified test curves shall be submitted to the Engineer.

PART 5. LIFT STATION CONTROLS STRUCTURE

A. Housing

1. The lift station control house shall be a complete factory engineered and manufactured unit. The station shall be sized to rest on a 8-foot diameter wet well, as shown on the equipment layout drawing. The baseplate shall be provided with a double door aluminum hinged wet well access cover with minimum dimensions of 48 x 72 inches. This cover shall be exterior to the fiberglass enclosure.
2. A fiberglass pump house shall contain and protect all valves and associated equipment. One access panel one each side of the pump house shall be provided to permit routine maintenance operations (i.e. frequently performed inspection and adjustment of the electrical components, controls and valves) through the panel openings of the pump house. The access panels shall open outward. A latch shall be provided to allow the contents of the housing to be protected with a keyed lock.
3. The pump house (less base) shall be designed to be completely removable without the use of lifting equipment. Removal may be accomplished by disassembly and shall not require more than two employees. No portion of the housing may project above the surface of base to hinder maintenance or endanger employees.
4. The pump house shall be manufactured of molded fiberglass reinforced isophthalic resins with a minimum of 30% fiberglass. The resin shall contain no fillers or extenders. Chopped strand mat shall be of commercial E-type glass. The pump house shall incorporate structural stability, corrosion resistance and watertight properties into the design. The laminate sequence shall provide a balance of mechanical, structural, chemical and electrical properties to provide years of service. The laminates must also be impervious to micro-organisms, mold mildew and corrosion. The pump house shall include fiberglass jacketed urethane foam insulation.
5. The interior of the pump house shall have a smooth resin rich surface free of any defects or blemishes to provide a maintenance free corrosion resistant finish. The exterior of the pump house shall be coated with a pigmented, UV resistant protective topcoat. Color to be provided by end user.
6. The pump house base shall be constructed of fiberglass encased reinforced concrete and shall be designed to resist deformation of the structure during shipping or handling. The base shall function as the wet well top and incorporate an aluminum access lid. The lid shall be sized to facilitate the installation and removal of the specified pump and shall be of sufficient size to permit access to the wet well.

B. Static Wet Well Vent

1. A static wet well vent shall be mounted in the station base and shall be housed in the station enclosure. The vent shall be manufactured of PVC and shall terminate through the station wall with a screened opening.

- C. Wiring
1. All wiring shall have not less than 600 volt insulation and all power wiring and bus shall be in complete conformity with the National Electric Code and state and local and NEMA Electrical Standards. Control wiring shall be color coded. All job connections required to conveniently replace control components shall be made at approved type terminal blocks with engraved bakelite marker strips or similar approved means.
 2. When required, a 3 KVA dry type single-phase power transformer shall be provided to supply power to the station single-phase loads. The transformer shall have a dust tight enclosure and shall be suitable for wall mounting. The transformer shall have Class H insulation and shall be UL approved for indoor applications.
 3. All wiring in the control panel shall be color-coded. Power wiring from the control panel to the pump motors shall be enclosed in polyvinyl covered flexible steel conduit, with compatible grounding fittings. Power entrance wiring shall be enclosed in the same manner.
- D. Alarm Light & Horn
1. To provide a local indication of a high wet well level, a complete alarm system shall be provided. The flashing red beacon light and horn is UL listed 120 VAC and approved for outdoor weatherproof installation. Features include shatter resistant Lexan lens and acrylic dome with stainless steel clamping rings. Easy lamp replacement with bayonet base type bulbs. The cast zinc base may be also doubled for use as a junction box for 1/2" pipe mounting or mounting on a 4" octagon box.

PART 6. PUMP CONTROL PANEL OPERATION

- A. The control panel shall operate the pumps and maintain a safe operating level in the wet well. The level of the wet well shall be monitored by a submersible differential pressure transducer with 2 backup float switches. The control system shall alternate each pump to the lead position with each consecutive pumping cycle. In the event one pump fails to handle the inflow, both pumps shall run in parallel. The controls shall sense individual failures in either pump for motor failure or pump seal failure and remove that pump from service and shall activate a light on the lift station controller indicating such failure. In the case of motor failure, the pump shall be locked out of service and remain so until manually reset on the lift station controller. The operation of the pumps shall be controlled automatically by the wet well level monitored by the submersible differential pressure transducer. The pumps and alarms shall be controlled via a lift station controller, the level, pumps and alarm status shall be visualized on the lift station controller. 6 Adjustable set points must be accessible:
1. #1. Low level set point
 2. #2. Lead pump off set point
 3. #3. Lag pump off set point
 4. #4. Start lead pump set point
 5. #5. Start lag pump set point
 6. #6. High level Alarm set point
- B. As the liquid in the wet well rises above set point #4 the first (lead) pump shall start, evidenced by the green run light on the panel.

- C. As the liquid in the wet well is pumped down the lead pump shall continue to operate until the stop lead level set point is reached and the controls shall stop the lead pump. The controller shall select the previous lag pump to operate as lead pump during the next pumping cycle.
- D. If the liquid level in the wet well continues to rise with the lead pump in operation, the second (lag) pump shall start when the fluid level reaches set point #5. A NEMA 4X rated red alarm light/buzzer on the exterior of the panel shall be activated when the level rises above set point # 6, and the alarm called out by the telemetry. The alarms shall reset when the level falls below the high-level set point. The alarm shall include a panel mounted silence switch for the alarm buzzer.
- E. As the wet well liquid level drops with both the lead and lag pumps running, both pumps shall remain on until the wet well level drops below the lag pump off and lead pump off set points. As the pumps stop, the run lights shall turn off and the alternator shall select the previous lag pump to operate as the lead pump for the next cycle.
- F. If at any time the station power is interrupted, an alarm shall be called out by the telemetry.

PART 7. PUMP CONTROL PANEL EQUIPMENT

- A. The control panel shall contain all necessary equipment to operate the lift station as noted above and, as a minimum, shall contain the following:
 - 1. Incoming power supply main terminals
 - 2. Pump connection terminals
 - 3. Seal fail and thermal cut out lead terminals
 - 4. Grounding lugs
 - 5. Pump circuit breakers
 - 6. Surge Protection Device
 - 7. Motor starters, Square D or equal
 - 8. 120V control circuit transformer
 - 9. Intrinsically safe circuit extensions to the 2 backup float switches.
 - 10. Submersible differential pressure transducer
 - 11. Lift station controller (MPE SC2000 or equal)
 - 12. Pump station monitor (MPE Pump Monitor Relays or equal)
 - 13. 200 Watt heater with thermostat control
 - 14. Panel Door Lock
 - 15. The control panel shall contain the following accessible at the inner door:
 - 16. 6 digit, non-resettable, elapsed run time meter for each pump.
 - 17. GFI duplex convenience receptacle.
 - 18. H-O-A selector switch for each pump.
 - 19. Pump run pilot lights.
 - 20. Overload fault pilot lights.
- B. All wiring shall be contained in rigid wiring channel and all terminations shall be clearly color coded and numbered for identification relating to the schematic. All terminals shall also be numbered and clearly identified.
- C. Analog input
 - 1. The controller shall come standard with a 4-20mA input channel. The digital readout will indicate the level of the well in tenths of a foot. The controller shall detect invalid sensor readings and open loop circuit and display a fault message and de-energize the relay outputs.

- D. Digital inputs
1. The controller shall come standard with 6 dedicated input channels.
 - a. Pump 1 running.
 - b. Pump 2 running.
 - c. Pump 1 seal fail. (MPE pump monitor relay)
 - d. Pump 2 seal fail. (MPE pump monitor relay)
 - e. Pump 1 thermal cut off. (MPE pump monitor relay)
 - f. Pump 2 thermal cut off. (MPE pump monitor relay)
 2. All input shall be switched via potential free contacts. There shall be an alarm reset button below the pump status indicator lights for clearing level and pump alarms when configured as latching faults.
- E. Relay outputs
1. The controller shall come standard with 4 SPDT relay outputs and shall each have an energized state indicator. Each output capable of switching 10A at 250VAC.
 - a. Low level alarm
 - b. High level alarm
 - c. Run pump 1 (To motor starter)
 - d. Run pump 2 (To motor starter)
- F. Level set points
1. The pump operation and alarm status shall be dependent on the following level set point:
 - a. Low level alarm
 - b. Stop level (lead pump)
 - c. Stop level (lag pump)
 - d. Start level (lead pump)
 - e. Start level (lag pump)
 - f. High level alarm
 2. Level adjustments shall be accomplished via the front keypad without the use of tools, laptop computer or extensive configuration. Pump operation shall be configurable for pump up or pump down applications relative to the level measurement.
- G. Display / Keypad
1. The controller shall allow the user to navigate through the configuration mode and adjust set point values via the front keypad. The controller setup shall be simple and shall not require the use of a laptop computer. A simulation mode shall be available for users to manually increase or decrease the level value from the keypad as to test the relay output sequence operation. The simulation mode shall end automatically when the user releases the keypad buttons and the actual level monitoring is resumed.
- H. Power
1. The controller shall require 110AC for proper operation. The controller shall be approved, registered and /or certified by the Underwriter Laboratory (UL). The controller shall internally produce 24VDC (30mA) for powering analog transducers.
- I. Pump Station Controller

1. The SC2000 Pump Controller manufactured by Motor Protection Electronics, Inc or approved equal shall operate the pumps based on selected values for set forth in the plans. The controller shall perform lag pump delays, and provide high and low level alarms.
- J. Submersible Transducer Level Control
1. The Level Monitor submersible transducer shall provide a rugged and cost-effective means to measure liquid for wastewater pumping applications.
 2. The Level Monitor submersible transducer shall contain a two stage surge suppressor circuit containing both MOV and TVS technology to provide high voltage transient protection for the transducer circuitry. The Level Monitor submersible transducer may also be used with MPE part number LM Surge, a din rail mountable external surge arrester. Part number LM Surge shall be used to provide additional protection for the 4-20mA loop while taking only minimal space within the control panel.
 3. The Level Monitor submersible transducer shall be used with the MPE transducer vent bellows (MPE part number TVB1) The TVB1 part shall be connected to the end of the vent tube of the Level Monitor to prevent moisture from entering the vent tube.
 4. The Level Monitor submersible transducer shall come standard with 40 feet of cable, and shall be able to be ordered with various lengths of cable. The Level Monitor submersible transducer shall be available in the pressures ranges five (5), 10 or 15 psi (11.5, 23.1 or 34.6 feet) The part number for the Level Monitor submersible transducer shall be LM – (followed by the Pressure Range) – (followed by the cable length). For a five (5) psi unit with 40 feet of cable, the part number shall be LM -5-40.
 5. The Level Monitor submersible transducer shall be manufactured by M.P. Electronics, Apopka, Florida and supplied by B&M Technical Services.
 6. The transducer assembly shall be installed where directed by the Engineer and connected with other system elements and placed in successful operation. It shall be provided with input power and output signal transient protection, associated control elements as specified herein and in accordance with manufacturer's instructions.
- K. Backup Float Level Control
1. The high- and low-level settings shall be monitored by, tilt to activate, float switches. Each float switch shall be wired to the pump station control panel termination point using one continuous cord (no splices allowed) and conforming to the NEC requirements. Each float switch shall have an intrinsically safe barrier at the entrance to the control panel.
 2. Each float switch shall be provided with a height adjustable weight to prevent turbulence from activating the float switch and preventing entanglement of the equipment.
 3. Each float switch shall be located in an area subject to the least turbulence and shall be anchored at the top of the pump station by a cord grip style float switch hanger. No sharp bends, which might cause fatigue in the float switch cords, shall be allowed.
 4. Both float switches shall activate the red alarm light upon the level reaching the indicated level. The high-water level switch shall run both pumps until the low level float shuts the pumps off in normal power usage.

5. In Generator operation, only one pump would be running at one time, so need to configure controls that one pump is disabled in generator power.

PART 8. FACTORY TEST

- A. All electrical equipment and controls shall be tested for correct operation. The piping shall be pressure tested with water to insure that no leaks exist.

PART 9. PUMP TESTS

- A. The pump manufacturer shall perform the following tests on each pump before shipment from the factory:
 1. Megger the motor for insulation breaks or moisture.
 2. Prior to submergence, the pump shall be run dry and be checked for correct rotation.
 3. Pump shall be run for one hour in a submerged condition at maximum rated power input.
 4. Pump shall be removed from test tank, measured immediately for moisture; oil plugs removed for checking lower seal; inspection plug removed for checking of upper seal and possible water intrusion of stator housing.
 5. A written certified test report giving the above information shall be supplied with each pump at the time of shipment.
 6. All end of pump cables will then be fitted with a rubber shrink fit boot to protect cable prior to electrical installation.

PART 10. INSTALLATION AND SERVICE INSTRUCTION

- A. Installation of the valve package shall be in accordance with the written installation instructions furnished by the manufacturer, and as recommended by the Engineer. In addition to these installation instructions, the manufacturer shall furnish four complete and detailed Operation and Maintenance manuals. These manuals shall cover the initial start-up, operating procedures, maintenance and servicing procedures on the major components in the pump station. Documentation & Shop Drawings
 1. Standard submittals will be bound and consist of six (4) four copies each of:
 - a. Pump station component bill of materials showing model and part numbers.
 - b. Complete, detailed pump station drawings.
 - c. Pump performance curve.
 - d. Component technical data showing materials of construction.
 - e. Electrical schematics.
 - f. Electrical equipment bill of materials showing models and part numbers.
 - g. Complete motor data including input kW, shaft BHP, full load amps, locked rotor amps, NEMA code letter, motor efficiency, power factor, and moment of inertia.
 - h. Dimensional prints.
 - i. Details on accessories being supplied.
 - j. Installation guides.
 - k. Technical Manuals.
 - l. Parts Lists.

- B. The CONTRACTOR shall supply the ENGINEER with four (4) copies of detailed shop drawings of this lift station including but not limited to a detailed layout drawing of the control cabinet. Prior to startup, the CONTRACTOR shall supply the OWNER with four (4) copies of an operating and maintenance manual for the lift station.

PART 11. PUMP WARRANTY

- A. The pump manufacturer shall warrant the pumps being supplied to the OWNER against defects in
- B. workmanship and materials for a period of five (5) years under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear on a progressive schedule of cost for a period of five (5) years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units. All consumable parts such as light bulbs, oil, grease, etc., shall be considered part of routine maintenance and shall not be covered under the terms of the manufacturer's warranty.

PART 12. ELECTRICAL WORK

- A. All electrical work shall conform to applicable provisions of the local and National Electrical Codes. The CONTRACTOR shall provide and install the electrical service entrance including the power pedestal, meter socket, and shall mount the control system enclosure as noted. Included with this item, the CONTRACTOR shall relocate and reconnect the existing generator and automatic transfer to the new control panel location.
- B. The CONTRACTOR shall be responsible for coordinating the service feed to the power pedestal with the power company to ensure the power is available in a timely manner. The CONTRACTOR must maintain the existing station in operation at all times either through maintaining the existing station in service or through bypass pumping, as the circumstances dictate.

PART 13. INITIAL OPERATION/START-UP

- A. The manufacturer shall provide the services of a factory trained representative for a maximum period of one day, to assist the contractor with the initial start-up of the pump station. It shall be the responsibility of the contractor to inform all parties of this initial start-up, and to insure their attendance. The manufacturer's representative shall instruct all personnel attending the start-up in the correct and required operation, maintenance and service procedures for the pump station.

PART 14. CORROSION PROTECTION

- A. After all fabrication has been completed, all exposed metal surfaces of the structure and piping shall be factory blasted to remove all rust, mill scales and weld slag. All weld spatter and surface roughness shall be removed by grinding. The blast profile on the steel should be 1.5 to 2.5 mils in depth and be of a sharp, jagged nature. Surfaces must be free of grit dust.

- B. Following the cleaning, all weld areas shall be coated by hand brushing using Devoe High Performance Coatings Bar-Rust 235 multi-purpose epoxy coating. Following the hand coating, the balance of the structure shall be coated per the attached specification.
- C. The structure and other exposed metal shall receive a 4-8 mils dry or 5.9 to 11.7 mils wet coating of Devoe High Performance Coatings Bar-Rust 235 multi-purpose epoxy coating. The high solids coating shall be an advance technology epoxy and have exceptional corrosion protection. The coating shall be suitable for salt and fresh water immersion. Solids by volume shall be 68% +/- 2%.
- D. A touch-up kit containing epoxy coatings, as specified above, shall be provided for the coating of all field welds and for repair of any scratches or abrasions that have occurred during shipment or installation.

--END OF SECTION--

33 3215 SUBMERSIBLE LIFT STATION COMPONENTS

A. DESCRIPTION

1. The CONTRACTOR shall furnish all materials and do all work necessary to furnish and install complete and ready for operation the components of the lift station included in the Scope of Work, together with all appurtenant items and facilities as shown on the plans and as specified. The pumps and controls shall be manufactured by Shinmaywa Pumps or approved equal. The naming of a manufacturer of equipment in this specification is not intended to eliminate competition or prohibit qualified manufacturers from offering equipment. Rather, the intent is to establish a standard of excellence for the material used, and to indicate a principle of operation desired. The contractors' bid shall be based on the use of B&M Technical Services, Inc. equipment. Unless the bidder clearly indicates in his bid that he is offering an equal product approved by the engineer via a pre bid submittal, his bid shall be considered as providing the brand name product referenced in the specifications above.
2. The contractor is hereby notified that responsibility for the complete and satisfactory operation or function of all equipment and materials, is definitely a part of this contract, regardless of the manufacturer's guarantee on any item furnished. It is the contractor's responsibility to place all equipment in operation, furnish all lubrication, packing and other accessories necessary for initial operation, and to see that proper operating and maintenance instructions are prepared and followed.

B. WORK INCLUDED

1. The work included is as provided in the Bid Form, Section 00 4100, or as indicated in the plans. Also refer to Specification 01 0100 Project Description and Special Conditions.

C. WET WELL STRUCTURE

1. The wet well structure for both lift stations shall generally remain as-is.
2. New stainless steel slide rail brackets shall be installed in both lift stations.
3. Each wetwell shall be fall-protected with grating inserts and tie-off systems as provided in the plans. Door panel(s) grate(s) shall be reinforced to withstand a live load of 300 LBS and be non-corrosive for wetwell gases and water vapor. Door panel safety grates shall be installed to open in a double leaf configuration to offer additional fall protection to the wetwell from the narrow end of the door frame opening.
4. For LS6, CONTRACTOR shall furnish and install the pump guide base mounting hardware, the pump upper guide rail brackets and guide rails (if necessary for compatibility), the level control system and mounting hardware, the submersible pumps, and all other items as shown on the plans and as required for a complete and operable submersible lift station.

D. DISCHARGE PIPING

1. For LS6, the submersible pumps, guide rails, guide brackets, discharge quick connect elbow, lifting chain, discharge risers, float brackets and associated equipment by B&M Technical Services. The use of any existing equipment shall be stated in the shop drawing submittal.
2. The piping shall be 4-inch Class 53 ductile iron pipe. The discharge lines from each pump shall include one 4 inch resilient seated check valve with outside lever and spring and one 4 inch eccentric plug valve. The check valves and plug valves shall be mounted in the wet well. A 4 inch common Class 53 ductile iron pipe discharge pipe shall terminate 6 inches below the baseplate with a plain end. The common header pipe shall include a plug valve to permit emergency access to the pump station force main after isolation of the pumps. The header pipe shall penetrate the wetwell side wall and terminate with a male OPW type quick connect fitting. A compression type coupling shall be furnished for connection to the forcemain, as noted on the plans. One operating lever shall be furnished for the plug valves.
3. The flanged plug valves shall be manufactured in accordance with ANSI B16.1 Class 125/150, including facing, drilling and flange thickness. Mechanical joint ends shall be in compliance with AWWA/ANSI C-

111-92. Valve bodies shall be cast iron. Plugs shall be in compliance with AWWA C-504-87, Section 2.2.2. The plugs shall be of one piece solid construction with PTFE thrust bearings on the upper and lower bearing journals to reduce torque and prevent dirt and grit from entering the bearing and seal area. Valves shall be furnished with a replaceable sleeve type bearings conforming to AWWA C-504- 87 and AWWA C-507-85. Bearings shall be stainless steel. Seals shall be self adjusting and repackable without removing the bonnet from the valve. Valves shall be designed and manufactured to shut off bubble tight at 175 PSI in either direction for valves 2 1/2" through 12". Valves shall be equipped with a 2" square nut for use with removable levers.

4. The flanged check valves shall be of swing type and meet the material requirements of AWWA specifications C508. The valve shall be iron body, bronze mounted, single gate for non-shock working pressure 175 psi and hydrostatically tested at double the working pressure. The valve shall be furnished with outside lever and spring or outside lever and weight. The check valves shall have a stainless steel hinge pin. The hinge pin shall operate in bronze support bearings.

E. SUBMERSIBLE PUMPS

1. ShinMaywa CNXH Series Pump 15 Hp provided by B&M Technical Services, Inc. or approved equal, for 230V 3 Phase from Phase Conversion.
2. Furnish and install solids handling submersible sewage pumps rated for use in Class 1, Division 1, Group D locations. The pump motor shall be an integral part of the unit. The pump shall be supplied with a cast iron guide rail base fitted with a discharge elbow. Each unit shall be fitted with a sufficient length of stainless steel lifting chain of adequate strength to permit raising and lowering of the pump. Each pump motor shall be equipped with the required length of combination power and control cable sized in accordance with NEC and ICEA standards. The cable shall have P-MSHA approval or FM approval for use in Class 1, Division 1, Group C & D locations.
3. Each pump shall be of the sealed submersible type as manufactured by ShinMaywa Industries and be capable of pumping municipal sewage with spherical solids up to three inches (3") in diameter. The pump, volute, motor, and seal housing shall be of high quality, ASTM A48, Class 30, gray cast iron. Casting shall have smooth surfaces devoid of blowholes or other casting irregularities. The pump discharge shall be fitted with a four-inch (4") standard ANSI 125# flange, faced and drilled. All external mating parts shall be machined and Buna N rubber o-ring sealed on a beveled edge. Machining and fitting shall be such that sealing is accomplished by automatic compression of o-rings in two plans and o-ring contact is made on four surfaces without the requirement of specific torque limits. Flat faces and gaskets shall not be acceptable. All fasteners exposed to the pump's liquids shall be of 304 series stainless steel.
4. The pump volute shall have smooth internal surfaces free from rough spots, gas holes, or flashing; shall be one-piece, circular design; and shall have a four-inch (4") flanged discharge. Scroll-type volute designs that tend to unbalance from wear resulting in shaft stress shall not be considered equal or acceptable. A volute casing wear ring shall be provided to minimize impeller wear. The wear ring shall be bronze and shall be easily replaceable in the field.
5. A single vane, non-clog, scroll impeller shall have scroll formed passage at its suction area and smoothly connected to single vane non-clog passage. The impeller shall have high pass-through capability with high-hydraulic efficiency and eliminate clogging, plugging, and entangling of fibrous obstacles with hydraulic efficiency, thus, reducing maintenance cost and operating cost. Impeller shall be statically and dynamically balanced. A wear ring of stainless steel shall be provided.
6. An upper radial bearing and lower thrust bearing shall be required in the motor. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be two ball bearings, designed for a long life [at least 100,000 hours (L10 at B.E.P. calculated)]. Bearings shall be locally available.
7. Rotor bars and short circuit rings shall be manufactured of cast aluminum. Motor Shaft shall be made from JIS420 J2. The pump shaft shall rotated on two bearing. Motor service factor shall be 1.15. Motor capable 20 starts per hour. The motor shall be designed for operation up to 104 °F (40 °C) ambient and with a temperature rise not to exceed 70 degree. The motor shall have a voltage tolerance of plus or minus

10%. The motor shall be non-overloading the entire specified range of operation. Motor over temperature protection shall be provided by miniature thermal protectors embedded on each winding. Leakage probe detector is provided for mechanical seal failure protection located in seal failure chamber. Mechanical seals must be locally available and nonproprietary.

8. Power cable jacket shall be made of an oil resistant PVC material, designed for submerged applications. Standard power cable length is 50 feet. Cable entry of submersible motor shall prevent incursion of the pumpage into the motor due to the phenomena known as “WICKING”, a portion of each conductor is stripped back exposing the copper conductor. The cable is placed in a mold and is molded into one piece. The mold rubber seals the end of the power cable and flows in between each strand of conductor. This feature prevents “WICKING”, through the fiber reinforcement found in standard submersible cable, and through the strands of the conductor itself.
9. The contractor shall provide explosion-proof seals, silicon seals, and a junction box between the control panel and the lift station wet well for the pump power cords and float control cords. All seals and the junction box must conform to the requirements of the National Electric Code.
10. Finishes. The pump shall be painted after assembly, but before testing, with an alkyd resin primer with an epoxy finish coat. The paint shall be applied in one coat with a minimum thickness of three (3) to four (4) mils.
11. Testing. The pumps shall be tested at the manufacturer’s plant before shipment in accordance with Hydraulic Institute Standards. Certified test curves shall be submitted to the Engineer.

F. LIFT STATION CONTROLS STRUCTURE

1. HOUSING
 - a. The lift station control panel shall be a complete factory engineered and manufactured unit. The station shall be sized to rest on an existing concrete pad, as shown on the plans, and include necessary mounting or bracing to withstand a 90 mph wind for 3-seconds.
2. HEATER
 - a. Provide heater for panel as required by manufacturer.
3. VENTILATION BLOWER (NOT REQUIRED)
 - b. A shaded pole ventilation blower shall exhaust accumulated heat through a screened and louvered opening in the fiberglass enclosure. The minimum capacity of the ventilation blower shall be 265 cubic feet per minute at 0" static pressure. Fresh air shall enter the enclosure through another screened and louvered opening in the opposite end of the enclosure.
4. STATIC WET WELL VENT (NOT REQUIRED)
 - a. A static wet well vent shall be mounted in the station base and shall be housed in the station enclosure. The vent shall be manufactured of PVC and shall terminate through the station wall with a screened opening.
5. LIGHTING
 - a. See site lighting as provided on plans.
6. WIRING
 - a. All wiring shall have not less than 600 volt insulation and all power wiring and bus shall be in complete conformity with the National Electric Code and state and local and NEMA Electrical Standards. Control wiring shall be color coded. All job connections required to conveniently replace control components shall be made at approved type terminal blocks with engraved bakelite marker strips or similar approved means.
 - b. When required, a dry type single-phase power transformer shall be provided to supply power to the station single-phase loads. The transformer shall have a dust tight enclosure and shall be suitable for

wall mounting. The transformer shall have Class H insulation and shall be UL approved for indoor applications.

- c. All wiring in the control panel shall be color-coded. Power wiring from the control panel to the pump motors shall be enclosed in polyvinyl covered flexible steel conduit, with compatible grounding fittings. Power entrance wiring shall be enclosed in the same manner.

7. ALARM LIGHT & HORN

- a. To provide a local indication of a high wet well level, a complete alarm system shall be provided. The flashing red beacon light and horn is UL listed 120 VAC and approved for outdoor weatherproof installation. Features include shatter resistant Lexan lens and acrylic dome with stainless steel clamping rings. Easy lamp replacement with bayonet base type bulbs. The cast zinc base may be also doubled for use as a junction box for ½" pipe mounting or mounting on a 4" octagon box.

G. PUMP CONTROL PANEL OPERATION

1. The control panel shall operate the pumps and maintain a safe operating level in the wet well. The level of the wet well shall be monitored by a submersible differential pressure transducer with 2 backup float switches. The control system shall alternate each pump to the lead position with each consecutive pumping cycle. In the event one pump fails to handle the inflow, both pumps shall run in parallel. The controls shall sense individual failures in either pump for motor failure or pump seal failure and remove that pump from service and shall activate a light on the lift station controller indicating such failure. In the case of motor failure, the pump shall be locked out of service and remain so until manually reset on the lift station controller. The operation of the pumps shall be controlled automatically by the wet well level monitored by the submersible differential pressure transducer. The pumps and alarms shall be controlled via a lift station controller, the level, pumps and alarm status shall be visualized on the lift station controller. Six (6) adjustable set points must be accessible:
 - #1. Low level set point
 - #2. Lead pump off set point
 - #3. Lag pump off set point
 - #4. Start lead pump set point
 - #5. Start lag pump set point
 - #6. High level Alarm set point
2. As the liquid in the wet well rises above set point #4 the first (lead) pump shall start, evidenced by the green run light on the panel.
3. As the liquid in the wet well is pumped down the lead pump shall continue to operate until the stop lead level set point is reached and the controls shall stop the lead pump. The controller shall select the previous lag pump to operate as lead pump during the next pumping cycle.
4. If the liquid level in the wet well continues to rise with the lead pump in operation, the second (lag) pump shall start when the fluid level reaches set point #5. A NEMA 4X rated red alarm light/buzzer on the exterior of the panel shall be activated when the level rises above set point # 6, and the alarm called out by the telemetry. The alarms shall reset when the level falls below the high-level set point. The alarm shall include a panel mounted silence switch for the alarm buzzer.
5. As the wet well liquid level drops with both the lead and lag pumps running, both pumps shall remain on until the wet well level drops below the lag pump off and lead pump off set points. As the pumps stop, the run lights shall turn off and the alternator shall select the previous lag pump to operate as the lead pump for the next cycle.
6. If at any time the station power is interrupted, an alarm shall be called out by the telemetry.

H. PUMP CONTROL PANEL EQUIPMENT

1. The control panel shall contain all necessary equipment to operate the lift station as noted above and, as a minimum, shall contain the following:
 - Incoming power supply main terminals
 - Pump connection terminals
 - Seal fail and thermal cut out lead terminals
 - Grounding lugs
 - Pump circuit breakers
 - Surge Protection Device
 - Motor starters, Square D or equal
 - 120V control circuit transformer
 - Intrinsically safe circuit extensions to the 2 backup float switches.
 - Submersible differential pressure transducer
 - Lift station controller (MPE SC2000 or equal)
 - Pump station monitor (MPE Pump Monitor Relays or equal)
 - 200 Watt heater with thermostat control
 - Panel Door Lock
 - The control panel shall contain the following accessible at the inner door:
 - 6 digit, non-resettable, elapsed run time meter for each pump.
 - GFI duplex convenience receptacle.
 - H-O-A selector switch for each pump.
 - Pump run pilot lights.
 - Overload fault pilot lights.
 - VFD Phase Conversion System, LS6
 - VFD System for Motor Starters, LS2
2. All wiring shall be contained in rigid wiring channel and all terminations shall be clearly color coded and numbered for identification relating to the schematic. All terminals shall also be numbered and clearly identified.
3. Analog input
 - a. The controller shall come standard with a 4-20mA input channel. The digital readout will indicate the level of the well in tenths of a foot. The controller shall detect invalid sensor readings and open loop circuit and display a fault message and de-energize the relay outputs.
4. Digital inputs
 - a. The controller shall come standard with 6 dedicated input channels.
 1. Pump 1 running.
 2. Pump 2 running.
 3. Pump 1 seal fail. (MPE pump monitor relay)
 4. Pump 2 seal fail. (MPE pump monitor relay)
 5. Pump 1 thermal cut off. (MPE pump monitor relay)
 6. Pump 2 thermal cut off. (MPE pump monitor relay)
 - b. All input shall be switched via potential free contacts. There shall be an alarm reset button below the pump status indicator lights for clearing level and pump alarms when configured as latching faults.
5. Relay outputs
 - a. The controller shall come standard with 4 SPDT relay outputs and shall each have an energized state indicator. Each output capable of switching 10A at 250VAC.
 - Low level alarm
 - High level alarm
 - Run pump 1 (To motor starter)
 - Run pump 2 (To motor starter)

6. Level set points
 - a. The pump operation and alarm status shall be dependent on the following level set point:
 1. Low level alarm
 2. Stop level (lead pump)
 3. Stop level (lag pump)
 4. Start level (lead pump)
 5. Start level (lag pump)
 6. High level alarm
 - b. Level adjustments shall be accomplished via the front keypad without the use of tools, laptop computer or extensive configuration. Pump operation shall be configurable for pump up or pump down applications relative to the level measurement.
7. Display / Keypad
 - a. The controller shall allow the user to navigate through the configuration mode and adjust set point values via the front keypad. The controller setup shall be simple and shall not require the use of a laptop computer. A simulation mode shall be available for users to manually increase or decrease the level value from the keypad as to test the relay output sequence operation. The simulation mode shall end automatically when the user releases the keypad buttons and the actual level monitoring is resumed.
8. Power
 - a. The controller shall require 110AC for proper operation. The controller shall be approved, registered and /or certified by the Underwriter Laboratory (UL). The controller shall internally produce 24VDC (30mA) for powering analog transducers.
9. Pump Station Controller
 - a. The SC2000 Pump Controller manufactured by Motor Protection Electronics, Inc or approved equal shall operate the pumps based on selected values for set forth in the plans. The controller shall perform lag pump delays, and provide high and low level alarms.
10. Submersible Transducer Level Control
 - a. The Level Monitor submersible transducer shall provide a rugged and cost-effective means to measure liquid for wastewater pumping applications.
 - b. The Level Monitor submersible transducer shall contain a two stage surge suppressor circuit containing both MOV and TVS technology to provide high voltage transient protection for the transducer circuitry. The Level Monitor submersible transducer may also be used with MPE part number LM Surge, a din rail mountable external surge arrester. Part number LM Surge shall be used to provide additional protection for the 4-20mA loop while taking only minimal space within the control panel.
 - c. The Level Monitor submersible transducer shall be used with the MPE transducer vent bellows (MPE part number TVB1) The TVB1 part shall be connected to the end of the vent tube of the Level Monitor to prevent moisture from entering the vent tube.
 - d. The Level Monitor submersible transducer shall come standard with 40 feet of cable, and shall be able to be ordered with various lengths of cable. The Level Monitor submersible transducer shall be available in the pressures ranges five (5), 10 or 15 psi (11.5, 23.1 or 34.6 feet) The part number for the Level Monitor submersible transducer shall be LM – (followed by the Pressure Range) – (followed by the cable length). For a five (5) psi unit with 40 feet of cable, the part number shall be LM -5-40.
 - e. The Level Monitor submersible transducer shall be manufactured by M.P. Electronics, Apopka, Florida and supplied by B&M Technical Services.
 - f. The transducer assembly shall be installed where directed by the Engineer and connected with other system elements and placed in successful operation. It shall be provided with input power and output signal transient protection, associated control elements as specified herein and in accordance with manufacturer's instructions.

11. Backup Float Level Control

- a. The high- and low-level settings shall be monitored by, tilt to activate, float switches. Each float switch shall be wired to the pump station control panel termination point using one continuous cord (no splices allowed) and conforming to the NEC requirements. Each float switch shall have an intrinsically safe barrier at the entrance to the control panel.
- b. Each float switch shall be provided with a height adjustable weight to prevent turbulence from activating the float switch and preventing entanglement of the equipment.
- c. Each float switch shall be located in an area subject to the least turbulence and shall be anchored at the top of the pump station by a cord grip style float switch hanger. No sharp bends, which might cause fatigue in the float switch cords, shall be allowed.
- d. Both float switches shall activate the red alarm light upon the level reaching the indicated level. The high-water level switch shall run both pumps until the low level float shuts the pumps off.

I. FACTORY TEST

1. All electrical equipment and controls shall be tested for correct operation. The piping shall be pressure tested with water to insure that no leaks exist.

J. PUMP TESTS

1. The pump manufacturer shall perform the following tests on each pump before shipment from the factory:
 - Megger the motor for insulation breaks or moisture.
 - Prior to submergence, the pump shall be run dry and be checked for correct rotation.
 - Pump shall be run for one hour in a submerged condition at maximum rated power input.
 - Pump shall be removed from test tank, measured immediately for moisture; oil plugs removed for checking lower seal; inspection plug removed for checking of upper seal and possible water intrusion of stator housing.
 - A written certified test report giving the above information shall be supplied with each pump at the time of shipment.
 - All end of pump cables will then be fitted with a rubber shrink fit boot to protect cable prior to electrical installation.

K. INSTALLATION AND SERVICE INSTRUCTION

1. Installation of the valve package shall be in accordance with the written installation instructions furnished by the manufacturer, and as recommended by the Engineer. In addition to these installation instructions, the manufacturer shall furnish four complete and detailed Operation and Maintenance manuals. These manuals shall cover the initial start-up, operating procedures, maintenance and servicing procedures on the major components in the pump station. Documentation & Shop Drawings
1. Standard submittals will be bound and consist of six (4) four copies each of:
 - Pump station component bill of materials showing model and part numbers.
 - Complete, detailed pump station drawings.
 - Pump performance curve.
 - Component technical data showing materials of construction.
 - Electrical schematics.
 - Electrical equipment bill of materials showing models and part numbers.
 - Complete motor data including input kW, shaft BHP, full load amps, locked rotor amps, NEMA code letter, motor efficiency, power factor, and moment of inertia.
 - Dimensional prints.
 - Details on accessories being supplied.
 - Installation guides.
 - Technical Manuals.

- Parts Lists.

2. The CONTRACTOR shall supply the ENGINEER with four (4) copies of detailed shop drawings of this lift station including but not limited to a detailed layout drawing of the control cabinet. Prior to startup, the CONTRACTOR shall supply the OWNER with four (4) copies of an operating and maintenance manual for the lift station.

L. PUMP WARRANTY

1. The pump manufacturer shall warrant the pumps being supplied to the OWNER against defects in
2. workmanship and materials for a period of five (5) years under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear on a progressive schedule of cost for a period of five (5) years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units. All consumable parts such as light bulbs, oil, grease, etc., shall be considered part of routine maintenance and shall not be covered under the terms of the manufacturer's warranty.

M. ELECTRICAL WORK

1. All electrical work shall conform to applicable provisions of the local and National Electrical Codes. The CONTRACTOR shall provide and install the electrical service entrance including the power pedestal, meter socket, and shall mount the control system enclosure as noted. Included with this item, the CONTRACTOR shall relocate and reconnect the existing generator and automatic transfer to the new control panel location.
2. The CONTRACTOR shall be responsible for coordinating the service feed to the power pedestal with the power company to ensure the power is available in a timely manner. The CONTRACTOR must maintain the existing station in operation at all times either through maintaining the existing station in service or through bypass pumping, as the circumstances dictate.

N. INITIAL OPERATION/START-UP

1. The manufacturer shall provide the services of a factory trained representative for a maximum period of one day, to assist the contractor with the initial start-up of the pump station. It shall be the responsibility of the contractor to inform all parties of this initial start-up, and to insure their attendance. The manufacturer's representative shall instruct all personnel attending the start-up in the correct and required operation, maintenance and service procedures for the pump station.

O. CORROSION PROTECTION

1. After all fabrication has been completed, all exposed metal surfaces of the structure and piping shall be factory blasted to remove all rust, mill scales and weld slag. All weld spatter and surface roughness shall be removed by grinding. Surface preparation will comply with SSPC-SP10 specifications. The blast profile on the steel should be 1.5 to 2.5 mils in depth and be of a sharp, jagged nature. Surfaces must be free of grit dust.
2. Following the cleaning, all weld areas shall be coated by hand brushing using Devco High Performance Coatings Bar-Rust 235 multi-purpose epoxy coating. Following the hand coating, the balance of the structure shall be coated per the attached specification.
3. The structure and other exposed metal shall receive a 4-8 mils dry or 5.9 to 11.7 mils wet coating of Devco High Performance Coatings Bar-Rust 235 multi-purpose epoxy coating. The high solids coating shall be an advance technology epoxy and have exceptional corrosion protection. The coating shall be suitable for salt and fresh water immersion. Solids by volume shall be 68% +/- 2%.
4. A touch-up kit containing epoxy coatings, as specified above, shall be provided for the coating of all field welds and for repair of any scratches or abrasions that have occurred during shipment or installation.

--END OF SECTION--

GENERATOR SIZING

LIFT STATION 8

VILLAGE OF KRONENWETTER

FEBRUARY 4, 2025

1. Design Load Summary:

Load Item Description	Running Draw (watts)	Starting Load Factor	Maximum Draw Load (watts)
15 Hp Single Pump	15923 (277V, 33-44 amps)	2	31846
Panel Power	300	2	600
Misc.	2400	1	2400
Unit Heater	2500	2	5000
Meters, Valves	----	----	----
Total	21123		39846 40 kW

2. Generator sizing to kVA

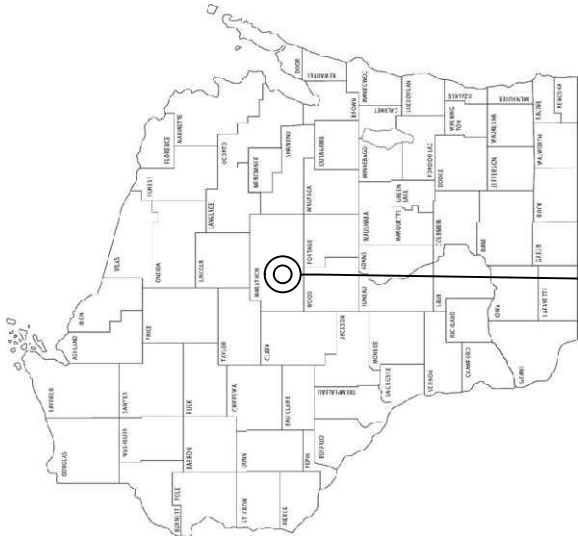
$$= 40 \text{ kW} / 0.8 \text{ for kVA}$$
$$= 50 \text{ kVA}$$

3. 50 kVA Generator or Equivalent, Natural Gas Unit, with Automatic Transfer Switch, 3-Phase Power Setup @ 277/480V, 60 Hz

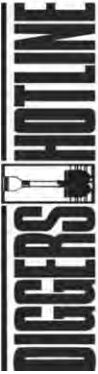
4. Electrician to Verify Final kVA Sizing Upon Confirmation of Site Rating, Input/Output Filter, Alternator Selection & VFD Selection

LIFT STATION #8 UPGRADE PROJECT TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, WISCONSIN



PROJECT LOCATION



OWNER:
VILLAGE OF KRONENWETTER
MARATHON COUNTY, WISCONSIN
1582 KRONENWETTER DR
KRONENWETTER, WISCONSIN,
54465
(715)693-4200 EXT. 1731
CHRIS VOLL, VILLAGE PRESIDENT
cvoll@kronenwetter.org

DIRECTOR OF PUBLIC WORKS:
GREG ULMAN
VILLAGE OF KRONENWETTER
1582 KRONENWETTER DRIVE
KRONENWETTER, WISCONSIN 54465
(715)574-3868
gulman@kronenwetter.org

ENGINEER / DESIGNER:
ROTH PROFESSIONAL SOLUTIONS
ROBERT J. ROTH, PE
315 DEWITT, ST.
PORTAGE, WI 53901
(608)571-3205
robert@rpsprofessionalsolutions.com

ELECTRIC & GAS:
WISCONSIN PUBLIC SERVICE (WPS)
P.O. BOX 19001
GREENBAY WI. 54307-9001
(800)242-9772
newserviceinstallation@wisconsinpublicservice.com

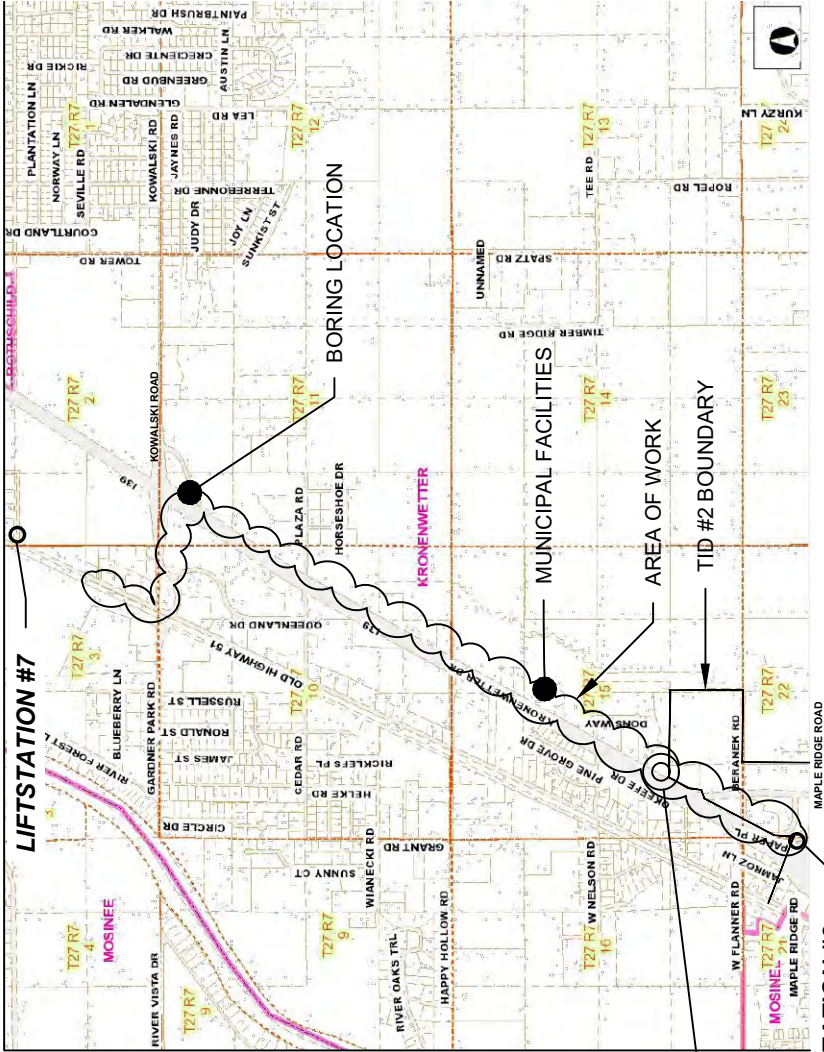
PROJECT ADDRESS:
LS #8 = 1210 KRONENWETTER DRIVE

OPERATOR:
MARK MACKEY
VILLAGE OF KRONENWETTER
1582 KRONENWETTER DRIVE
KRONENWETTER, WISCONSIN 54465
(715)574-3868
mmackey@kronenwetter.org

PUBLIC WORKS CREW LEADER:
BRAD JACOBSON
VILLAGE OF KRONENWETTER
1582 KRONENWETTER DRIVE
KRONENWETTER, WISCONSIN 54465
(715)574-3868
bjacobson@kronenwetter.org

CABLE/TELEPHONE:
SPECTRUM BUSINESS
SPECTRUM OF WISCONSIN

APPLICABLE CODES:
ZONING ORDINANCE, CHAPTER 485
WDNR EROSION CONTROL=NR 216
EROSION CONTROL, CHAPTER 270
WDNR SANITARY SEWERS=NR110
WDNR WATER = NR811
VILLAGE WATER & SEWER, CHAPTER 508
VILLAGE STREETS, CHAPTER 454
WISDOT STATUS 86.07(2)(a) & TRANS 231
NEC 2017
ELECTRICAL SPS=316
INTERNATIONAL FUEL GAS CODE= IFGC2015



LIFT STATION #8
VILLAGE OF KRONENWETTER

SHEET No.	TITLE PAGE	SHEET NAME
T 1.0	NOTES, ABBREVIATIONS, LEGEND	
T 1.1	BENCH MARKS & SURVEY NOTES	
T 1.2	SURVEY NOTES	
T 1.3		
		LIFT STATION SHEETS
B 1.0	LIFTSTATION #8 SECTION	
B 2.0	LIFTSTATION #8 PUMP SECTION	
B 2.1	ABOVE GROUND VALVE VAULT DETAIL	
B 2.2	LIFT STATION #8 FORCE MAIN PIGGING SCHEMATIC	
B 3.0	#8 LS EXISTING SITE PLAN	
B 3.1*	#8 LS PROPOSED SITE PLAN	
		CIVIL SHEETS
C 1.0	OVERALL PROJECT PLAN	
C 1.1*	PLAN & PROFILE - STA 0+00 TO 10+00	
C 1.2*	PLAN & PROFILE - STA 10+00 TO 32+00	
C 1.3*	PLAN & PROFILE - STA 32+00 TO 54+00	
C 1.4*	PLAN & PROFILE - STA 54+00 TO 76+00	
C 1.5*	PLAN & PROFILE - STA 76+00 TO 98+00	
C 1.6*	PLAN & PROFILE - STA 98+00 TO 120+00	
C 1.7*	PLAN & PROFILE - STA 120+00 TO 141+00	
C 1.8*	PLAN & PROFILE - STA 141+00 TO 152+00	
C 1.9*	PLAN & PROFILE - STA 152+00 TO 166+48	
		DETAILS
D 1.0-1.3	EROSION CONTROL DETAILS	
D 1.4	GROUND WATER PUMP DISCHARGE BASIN	
D 2.0	WATER MAIN DETAILS	
D 3.0-3.2	SANITARY SEWER DETAILS	
D 4.0-4.1	WISDOT STANDARD DETAILS DRAWINGS-FENCE	
		ELECTRICAL
E 1.0	ELECTRICAL ONE-LINE DIAGRAM	
E 1.1-1.3	ELECTRICAL DETAILS	
E 1.4	ELECTRICAL STREET LIGHT DETAIL	
		UTILITIES
F 1.0	GENERATOR & GAS SERVICE DETAILS	

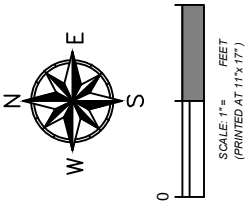
* EROSION CONTROL ON THESE SHEETS



TITLE SHEET

LIFT STATION #8 UPGRADE PROJECT
TAX INCREMENTAL FINANCE DISTRICT #2

FOR CONSTRUCTION
03/12/25



PROJECT NO:	2023-020 (F)
DATE:	12/15/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	T 1.0



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GENERAL NOTES:

1. OWNER/CONTRACTOR IS RESPONSIBLE FOR ALL PROJECT SAFETY AND SAFETY COMPLIANCE.
2. CONSIDER ALL EXISTING UTILITY LOCATIONS SHOWN ON THE DRAWINGS AS APPROXIMATE AND NOT NECESSARILY COMPLETE. THE CONTRACTOR SHALL OBTAIN UTILITY LOCATES AT LEAST 24 HOURS PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL ALSO VERIFY EXACT LOCATIONS OF ALL BURIED UTILITIES. PROTECT AND RESTORE ALL UTILITIES TO THE UTILITY OWNERS SATISFACTION. CONTACT THE APPROPRIATE UTILITY FOR A FIELD LOCATION PRIOR TO STARTING ANY CONSTRUCTION .
3. WORK LIMITS ARE IDENTIFIED AS THE OUTER PROPERTY BOUNDARY. NOTIFY THE OWNER OR ENGINEER 24 HOURS PRIOR TO DISTURBING ANY AREA OUTSIDE THE CONSTRUCTION LIMITS. DAMAGE OR DISTURBANCE OUTSIDE OF THE CONSTRUCTION LIMITS SHALL BE REPAIRED INKIND.
4. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL LAWS, RULES AND REGULATIONS IN FORCE AT THE TIME OF CONSTRUCTION.
5. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL CONSTRUCTION WITH OTHER CONTRACTORS INVOLVED WITH CONSTRUCTIONS OF THE PROPOSED DEVELOPMENT AND FOR REPORTING ANY ERRORS OF DISCREPANCY BETWEEN THESE PLANS AND/OR PLANS PREPARED BY OTHERS. IF ANY ERRORS, DISCORDANCES, OR OMISSIONS BECOME APPARENT, THESE SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER OR ENGINEER PRIOR TO CONSTRUCTION OF ANYTHING AFFECTED SO THAT CLARIFICATION OR REDESIGN MAY OCCUR.
6. THE CONTRACTOR SHALL MAINTAIN A PEDESTRIAN FENCE AROUND ALL SIGNIFICANT EXCAVATION TO BE LEFT OPEN DURING WORK OR OVERNIGHT

ABBREVIATIONS

AC	ASPHALT CONCRETE
BLDG	BUILDING
CMP	CORRUGATED METAL PIPE
C.O.	CLEAN OUT
DPW	DEPARTMENT OF PUBLIC WORKS
DIA.	DIAMETER
DI	DUCTILE IRON PIPE
E	EAST
EA.	EACH
ELEV.	ELEVATION
ESMT.	EASEMENT
EX	EXISTING
EOP	EDGE OF PAVEMENT
FEE	FINISH FLOOR ELEVATION
FG	FINISH GRADE
GAL.	GALLON
GV/VB	GATE VALVE/VALVE BOX
HORZ.	HORIZONTAL
INV.	INVERT
L	LENGTH
L.F.	LINEAR FEET
MBW	MODULAR BLOCK WALL
MAX.	MAXIMUM
MIN.	MINIMUM
N	NORTH
NOR	NORMAL
A.A.A.	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
OHE	OVERHEAD ELECTRIC
R	RADIUS
RMV	REMOVE
S	SOUTH
SB	SOIL BORING
SCH	SCHEDULE
SHT.	SHEET
SS	STAINLESS STEEL
S.M.D.	STANDARD MAXIMUM DENSITY
STA.	STATION
SVC	SERVICE
TC	TOP CONCRETE OR CURB
TH	TEST HOLE
TP	TOP OF PAVEMENT
TSW	TOP OF SIDEWALK
TYP.	TYPICAL
U.G.	UNDERGROUND
VERT.	VERTICAL
w/	WITH
w	Water
W	WEST
WV	WATER VALVE



YARD PUMP
GAS VALVE
WATER VALVE
LIGHT POLE
SIGN
TELEPHONE PEDESTAL
TEST HOLE
EX. SANITARYMANHOLE
EX. STORM MANHOLE
PROPOSED MANHOLE
POLE
GUY WIRE
WATER HYDRANT
WATER BOX
DECIDUOUS TREES
CONIFEROUS TREES
CONCRETE SURFACE
GRAVEL SURFACE
ASPHALT SURFACE
WETLAND
DRAINAGE DIRECTION
TRAFFIC FLOW
INLET BASIN
CATCH BASIN

EXISTING FENCE
PROPOSED FENCE
SILT FENCE
SILT LOG
WATER LINE
GAS LINE
FORCE MAIN
SANITARY SEWER
STORM SEWER
TELEPHONE LINE
OVERHEAD ELECTRIC
UNDERGROUND ELECTRIC
FIBER OPTICS
GRADING LIMITS
GUARD RAIL
TAX PARCEL LINES
COMMUNICATION LINE
FORCEMAIN FROM MAPS
WATER MAIN FROM MAPS

LEGEND

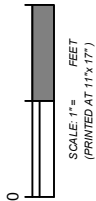
NOTES, ABBREVIATIONS, LEGEND

LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

FOR CONSTRUCTION
03/12/25



PROJECT NO: 2023-020 (F)

DATE: 12/05/24

DESIGNED BY: RJR

DRAWN BY: WAC

SHEET: T 1.1



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UTILITY DISCLAIMER		FOR CONSTRUCTION 03/12/25	0 SCALE: 1"= FEET (PRINTED AT 11"x17")	PROJECT NO: 2023-020 (F) DATE: 01/05/24 DESIGNED BY: RJR DRAWN BY: WAC SHEET: T 1.2	SURVEY NOTES LIFT STATION #8 UPGRADE PROJECT TAX INCREMENTAL FINANCE DISTRICT #2 VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN RPS ROTH PROFESSIONAL SOLUTIONS © Copyright Roth Professional Solutions, 2022				

UTILITY DISCLAIMER

The locations of all above ground utilities and appurtenances (i.e. manhole rims, valve box covers, hydrants, transformers, etc.), of which can be visually inspected, are shown hereon based on actual surveyed location. Rim elevations of sanitary sewer and storm sewer manholes, of which can be visually inspected, are shown hereon based on actually surveyed elevation. Depths, sizes, and material types of pipes, which can be visually inspected, entering and exiting sanitary sewer and storm sewer manholes, are shown hereon based on visual inspection, field measurements, and as-built mapping, if available. If depths, sizes, and material types of pipes are shown hereon, based on as-built mapping only, they are noted accordingly, and are considered approximate. Visual inspection means what can be seen from the ground surface. Point of Beginning did not enter into manholes to complete visual inspection underground.

The locations of all underground utilities and appurtenances, unable to visually inspect and/or field measure, shown hereon are only approximate. These utilities and appurtenances will be shown based on plans obtained from utility companies or provided by the Owner/Client, and markings by utility companies and municipalities ('Diggers Hotline') and other appropriate sources (with reference as to the source of information). Additional utility lines not discovered, marked, or shown on as-built plans available to us, during the search of records and the field survey, may exist. Any contractor using the information shown hereon will be forewarned that any excavation upon this site may result in the discovery of additional underground utilities not shown hereon. POB makes no warranty of any kind, express or implied, with respect to the existing underground utilities and appurtenances, of which are unable to visually inspect and/or field measure, whether shown hereon, or not. Prior to construction, it is the contractors responsibility to field verify locations, depths, sizes and types of underground public and private utilities or substructures within all construction limits and shall bring forward, in writing to the Engineer and/or Surveyor of Record, all discrepancies that do not align with the existing conditions as shown hereon provided.

*Diggers Hotline Tickets #20240507157, #20240507163, #20240507170, #20240507171, #20240507173, #20240507179, #20240507185, #20240507190, #20240507196, #20240507197, #20240507201, #20240507203, #20240507205, #20240507208, #20240507212, #20240507214, #20240507218, #20240507223, #20240507227 and #20240507230 for public utilities were ordered for this survey.

*A private utility locate was not a part of the scope of work contracted for this project and was therefore not ordered.

BENCH MARK

ELEVATIONS ARE REFERENCED TO NAVD 88 DATUM.,
LOCATIONS SHOWN ON PLANS

BENCHMARK #1

SOUTHEAST FLANGE BOLT ON HYDRANT,
LOCATED APPROXIMATELY 260 FEET SOUTH OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
MAPLE RIDGE ROAD.
ELEVATION = 1164.09

BENCHMARK #2

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 315 FEET EAST OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
FIELD ROAD.
ELEVATION = 1165.88

BENCHMARK #3

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 475 FEET WEST OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
FIELD ROAD.
ELEVATION = 1162.55

BENCHMARK #4

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 540 FEET SOUTHWEST OF
BENCHMARK #3.
ELEVATION = 1167.53

BENCHMARK #5

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 375 FEET NORTH OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
SEDONA COURT.
ELEVATION = 1182.66

BENCHMARK #6

BURY BOLT ON HYDRANT,
LOCATED ON THE SOUTH CORNER OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
PINEDALE LANE.
ELEVATION = 1178.42

BENCHMARK #7

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 635 FEET SOUTHWEST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
PINEDALE LANE.
ELEVATION = 1185.00

BENCHMARK #8

BURY BOLT ON HYDRANT,
LOCATED ON THE SOUTH CORNER OF THE
INTERSECTION OF KRONENWETTER DRIVE, PINEDALE
LANE AND INDIANHEAD DRIVE.
ELEVATION = 1201.56

BENCHMARK #9

BURY BOLT ON HYDRANT,
LOCATED ON WEST SIDE OF INDIANHEAD DRIVE,
APPROXIMATELY 680 FEET SOUTHWEST OF THE
INTERSECTION OF KRONENWETTER DRIVE, PINEDALE
LANE AND INDIANHEAD DRIVE.
ELEVATION = 1196.49

BENCHMARK #10

BURY BOLT ON HYDRANT,
LOCATED AT THE NORTHEAST CORNER OF THE
INTERSECTION OF OAKDALE LANE AND WINDWOOD
ROAD.
ELEVATION = 1205.52

BENCHMARK #11

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF THE INTERSECTION
OF OAKDALE LANE AND WEDGEWOOD DRIVE.
ELEVATION = 1190.54

BENCHMARK #12

BURY BOLT ON HYDRANT,
LOCATED AT THE SOUTHEAST CORNER OF THE
INTERSECTION OF WEDGEWOOD DRIVE AND
PINEDALE LANE.
ELEVATION = 1179.22

BENCHMARK #13

BURY BOLT ON HYDRANT,
LOCATED AT THE SOUTHEAST CORNER OF THE
INTERSECTION OF WINDWOOD ROAD AND
PINEDALE LANE.
ELEVATION = 1187.66

BENCHMARK #14

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 215 FEET NORTH OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
PAPER PLACE.
ELEVATION = 1162.29

BENCHMARK #15

60d SPIKE ON EAST SIDE OF POWER POLE,
LOCATED AT THE NORTHWEST QUADRANT OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
BERANEK ROAD.
ELEVATION = 1164.08

BENCHMARK #16

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 700 FEET SOUTHWEST OF
BENCHMARK #17.
ELEVATION = 1163.90

BENCHMARK #17

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 1090 FEET SOUTHWEST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
MAPLE PARK DRIVE.
ELEVATION = 1166.51

BENCHMARK #18

BURY BOLT ON HYDRANT,
LOCATED AT THE SOUTHEAST CORNER OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
MAPLE PARK DRIVE.
ELEVATION = 1169.20

BENCHMARK #19

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 1160 FEET NORTHEAST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
MAPLE PARK DRIVE.
ELEVATION = 1173.73

BENCHMARK #20

60d SPIKE ON EAST SIDE OF POWER POLE,
LOCATED ON THE WEST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 895 FEET SOUTHWEST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
JANES LAKE ROAD.
ELEVATION = 1171.60

BENCHMARK #21

3/4" IRON REBAR WITH CAP,
LOCATED ON THE WEST SIDE OF THE INTERSECTION
OF KRONENWETTER DRIVE AND JANES LAKE ROAD.
ELEVATION = 1165.29

BENCHMARK #22

60d SPIKE ON WEST SIDE OF POWER POLE,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 1020 FEET NORTHEAST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
JANES LAKE ROAD.
ELEVATION = 1167.96

BENCHMARK #23

60d SPIKE ON WEST SIDE OF POWER POLE,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 960 FEET SOUTHWEST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
PLAZA ROAD.
ELEVATION = 1172.66

BENCHMARK #24

60d SPIKE ON WEST SIDE OF POWER POLE,
LOCATED ON THE NORTHEAST CORNER OF THE
INTERSECTION OF KRONENWETTER DRIVE AND
PLAZA ROAD.
ELEVATION = 1174.23

BENCHMARK #25

60d SPIKE ON WEST SIDE OF POWER POLE,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 1030 FEET NORTHEAST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
PLAZA ROAD.
ELEVATION = 1173.67

BENCHMARK #26

60d SPIKE ON WEST SIDE OF POWER POLE,
LOCATED ON THE EAST SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 1025 FEET NORTHEAST OF
BENCHMARK #25.
ELEVATION = 1173.75

BENCHMARK #27

60d SPIKE ON SOUTH SIDE OF POWER POLE,
LOCATED ON THE NORTH SIDE OF KRONENWETTER
DRIVE, APPROXIMATELY 655 FEET SOUTHWEST OF
THE INTERSECTION OF KRONENWETTER DRIVE AND
KOWALSKI ROAD.
ELEVATION = 1174.89

BENCHMARK #28

SOUTHWEST BOLT ON LIGHT POLE BASE,
LOCATED IN THE EASTERN MEDIAN WITHIN THE
INTERSECTION OF KRONENWETTER DRIVE AND
KOWALSKI ROAD.
ELEVATION = 1185.91

BENCHMARK #29

NORTHEAST BOLT ON LIGHT POLE BASE,
LOCATED IN A MEDIAN WITHIN KOWALSKI ROAD,
APPROXIMATELY 745 FEET EAST OF BENCHMARK #30.
ELEVATION = 1200.62

BENCHMARK #30

SOUTHEAST BOLT ON LIGHT POLE BASE,
LOCATED IN A MEDIAN WITHIN KOWALSKI ROAD,
APPROXIMATELY 585 FEET NORTHEAST OF THE
INTERSECTION OF KOWALSKI ROAD AND
QUEENLAND DRIVE.
ELEVATION = 1178.47

BENCHMARK #31

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF THE INTERSECTION
OF KOWALSKI ROAD AND QUEENLAND DRIVE.
ELEVATION = 1177.38

BENCHMARK #32

NORTHEAST BOLT ON TRAFFIC SIGNAL BASE,
LOCATED ON THE EAST SIDE OF THE INTERSECTION
OF KOWALSKI ROAD AND OLD HIGHWAY 51.
ELEVATION = 1173.03

BENCHMARK #33

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF OLD HIGHWAY 51,
APPROXIMATELY 660 FEET NORTHEAST OF THE
INTERSECTION OF KOWALSKI ROAD AND OLD HIGHWAY
51.
ELEVATION = 1173.02

BENCHMARK #34

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF OLD HIGHWAY 51,
APPROXIMATELY 590 FEET SOUTHWEST OF
BENCHMARK #35.
ELEVATION = 1174.62

BENCHMARK #35

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF OLD HIGHWAY 51,
APPROXIMATELY 795 FEET SOUTHWEST OF THE
INTERSECTION OF OLD HIGHWAY 51 AND GATE OF
HEAVEN DRIVE.
ELEVATION = 1177.02

BENCHMARK #36

BURY BOLT ON HYDRANT,
LOCATED AT THE NORTHEAST CORNER OF THE
INTERSECTION OF OLD HIGHWAY 51 AND
GATE OF HEAVEN DRIVE.
ELEVATION = 1174.26

BENCHMARK #37

BURY BOLT ON HYDRANT,
LOCATED ON THE EAST SIDE OF PAPER PLACE,
APPROXIMATELY 530 FEET NORTHEAST OF LIFT
STATION NO. 8.
ELEVATION = 1165.44

BENCHMARK #38

BURY BOLT ON HYDRANT,
LOCATED APPROXIMATELY 25 FEET SOUTH OF LIFT
STATION NO. 8.
ELEVATION = 1169.19

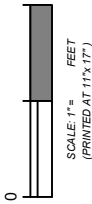
BENCH MARK INFORMATION

LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

FOR CONSTRUCTION
03/12/25



PROJECT NO: 2023-020 (F)

DATE: 01/05/24

DESIGNED BY: RJR

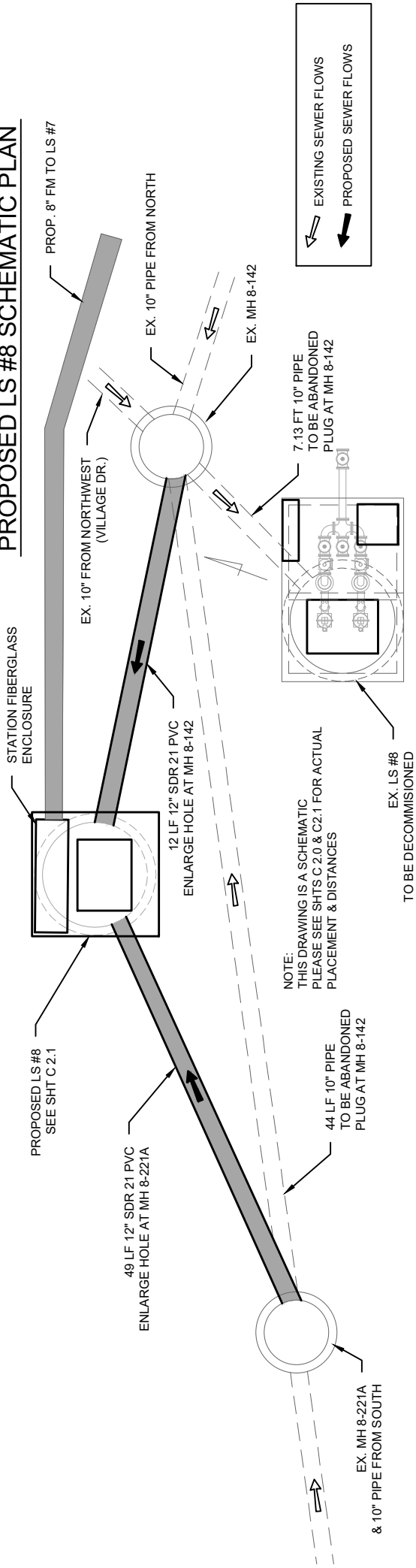
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SHEET: T 1.3



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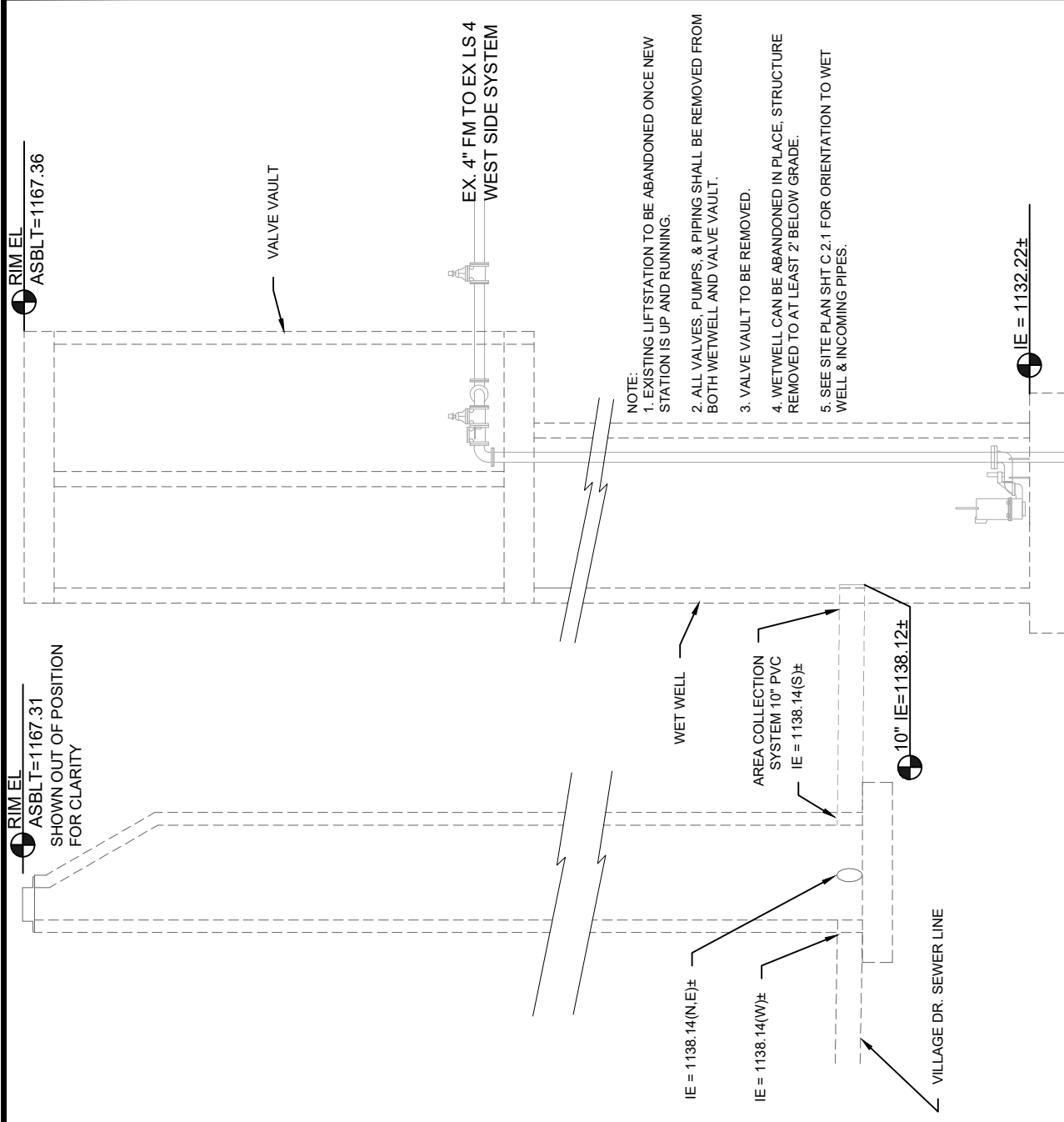
PROPOSED LS #8 SCHEMATIC PLAN



NOTE:
THIS DRAWING IS A SCHEMATIC
PLEASE SEE SHTS C 2.0 & C2.1 FOR ACTUAL
PLACEMENT & DISTANCES

44 LF 10" PIPE
TO BE ABANDONED
PLUG AT MH 8-142

TO BE DECOMMISSIONED



NOTE:
1. EXISTING LIFTSTATION TO BE ABANDONED ONCE NEW STATION IS UP AND RUNNING.

2. ALL VALVES, PUMPS, & PIPING SHALL BE REMOVED FROM BOTH WETWELL AND VALVE VAULT.

3. VALVE VAULT TO BE REMOVED.

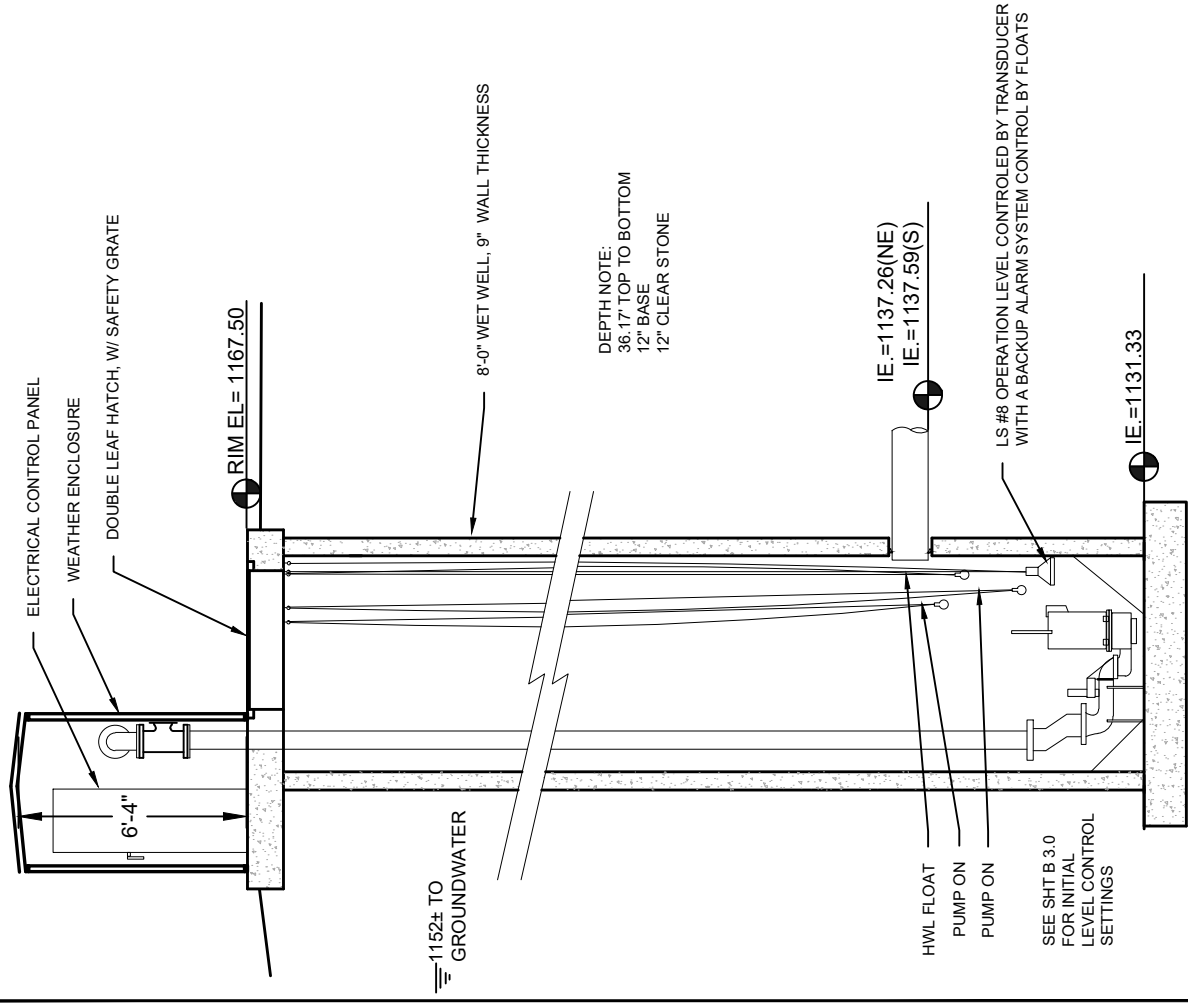
4. WETWELL CAN BE ABANDONED IN PLACE, STRUCTURE REMOVED TO AT LEAST 2' BELOW GRADE.

5. SEE SITE PLAN SHT C.2.1 FOR ORIENTATION TO WET WELL & INCOMING PIPES.

IE = 1132.22±

LIFTSTATION #8 EXISTING SECTION

SCALE = 3/16" = 1'-0"



SEE SHT B:
FOR INITIAL
LEVEL CON-
SETTINGS

LS #8 OPERATION LEVEL CONTROL BY TRANSDUCER WITH A BACKUP ALARM SYSTEM CONTROL BY FLOATS

DE IE.=1131.33

LIFTSTATION #8 PROPOSED SECTION

SCALE = 3/16" = 1'-0"

BORING
SEE SHEET C 2.0 FOR LOCATION
EL=1167.00
VISUAL NOTES

3" OF DARK BROWN SILTY SAND TOPSOIL
BROWN F-M SAND LITTLE SILT, LITTLE GRAVEL (FILL) (USCS: SP-SM) FROM 3" TO 15' FT
WATER ENCOUNTERED AT 15 FT. LOOSE TO MEDIUM BROWN F-M SAND, LITTLE SILT, LITTLE GRAVEL (USCS: SP-SPM) HARD DRILLING @ 42.5 FT AUGER REFUSAL @ 45 FT

END AT 45 FT.

DEPTH NOTE:
36.17' TOP TO BOTTOM
12" BASE
12" CLEAR STONE

8'-0" WET WELL, 9" WALL THICKNESS

RIM EL= 1167.50

ELECTRICAL CONTROL PANEL

WEATHER ENCLOSURE

DOUBLE LEAF HATCH, W/ SAFETY GRATE

FOR CONSTRUCTION
03/12/25

LIFTSTATION #8 SECTIONS

LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN



NOT TO SCALE



WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation

SHEET: B1.0

WAC

RJR

01/05/24

PROJECT NO: 2023-020 (F)

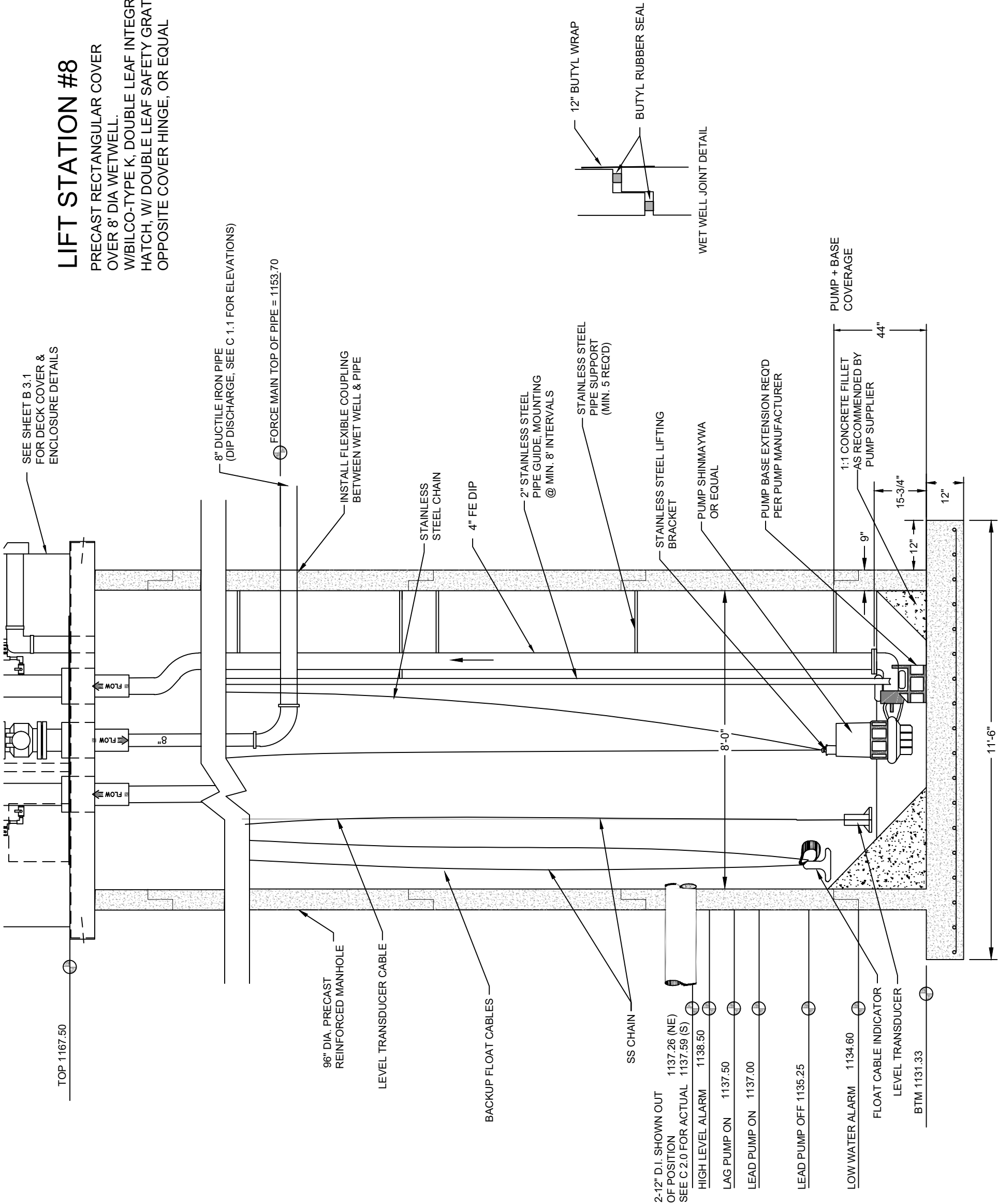
FOR CONSTRUCTION

03/12/25

PROJECT NO:	2023-020 (F)
DATE:	01/05/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	B 2.0

LIFT STATION #8

PRECAST RECTANGULAR COVER OVER 8' DIA WETWELL. W/BILCO-TYPE K, DOUBLE LEAF INTEGRATED HATCH, W/ DOUBLE LEAF SAFETY GRATING, OPPOSITE COVER HINGE, OR EQUAL



TYPICAL ABOVE GROUND VALVE VAULT DETAILS

LIFT STATION #8 UPGRADE PROJECT

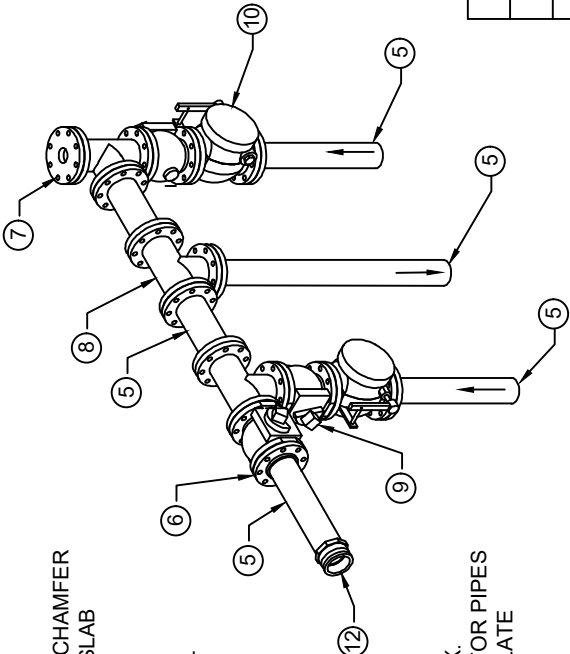
TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

FOR CONSTRUCTION

03/12/25

PROJECT NO:	2023-020 (F)
DATE:	01/05/24
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DRAWN BY:	WAC
SHEET:	B 2.1



PROVIDE 1" CHAMFER
ON COVER SLAB
ALL SIDES

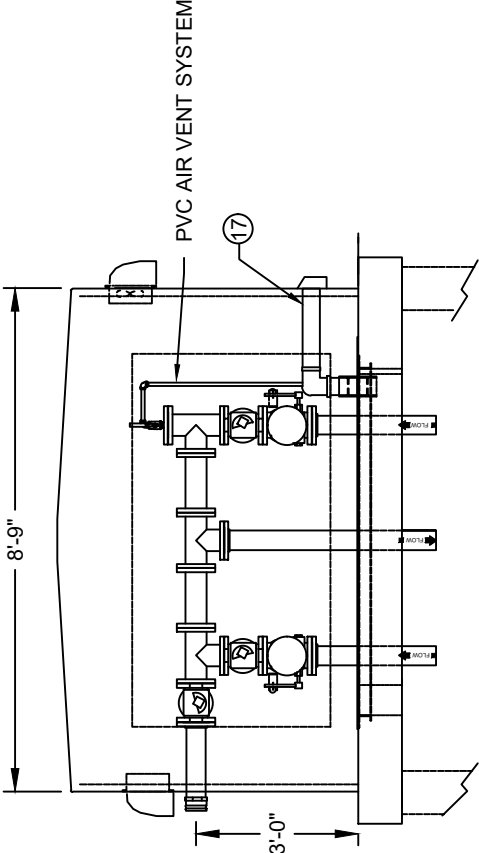
ELECTRICAL OUTLET
BLOWER, HEATER,
& THERMOSTATE

WETWELL VENT

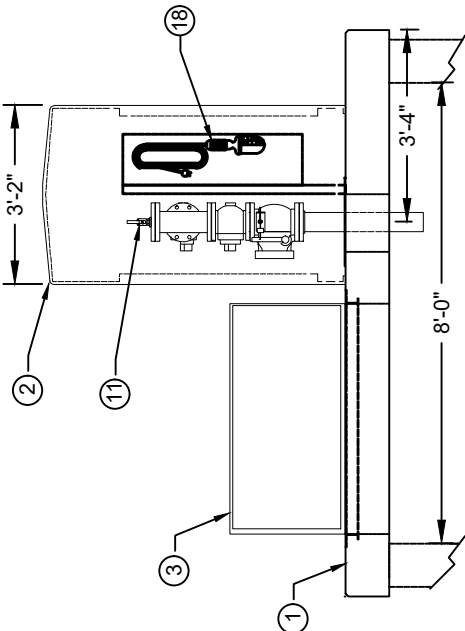
INDICATES APPROX.
SIZE OF OPENING FOR PIPES
COVERED BY SS PLATE
8" DIA WETWELL

EMBEDDED
LIFT HOOKS

PLAN VIEW



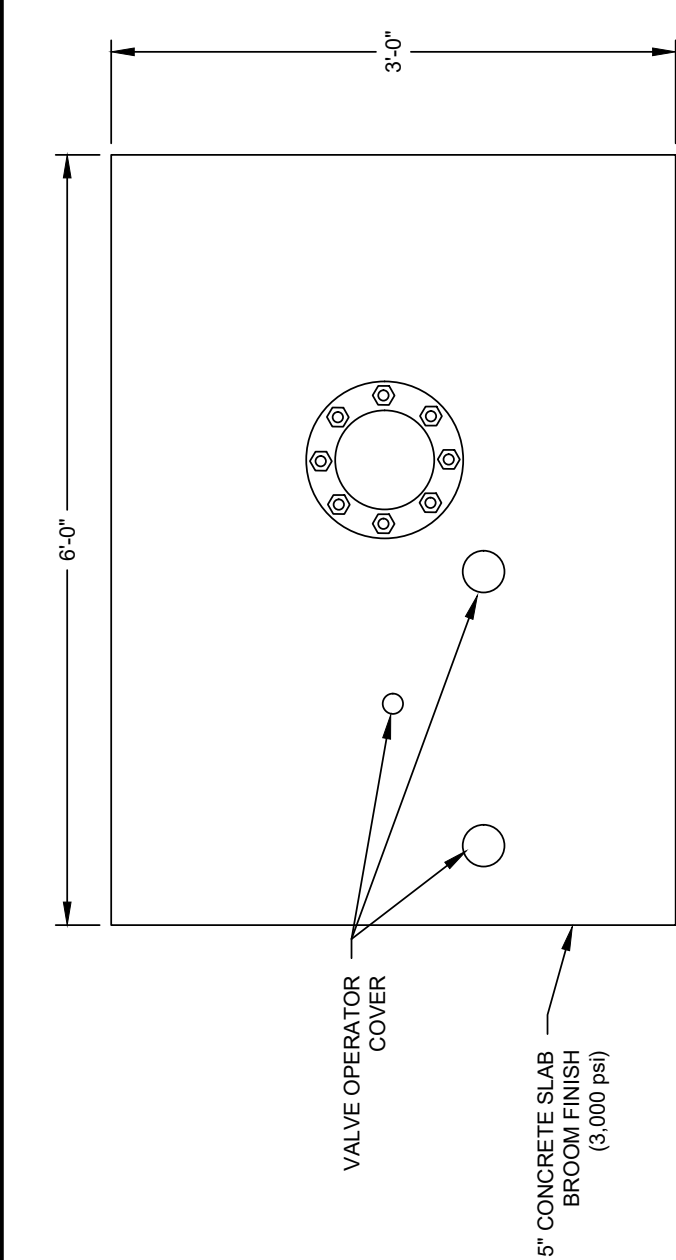
FRONT VIEW



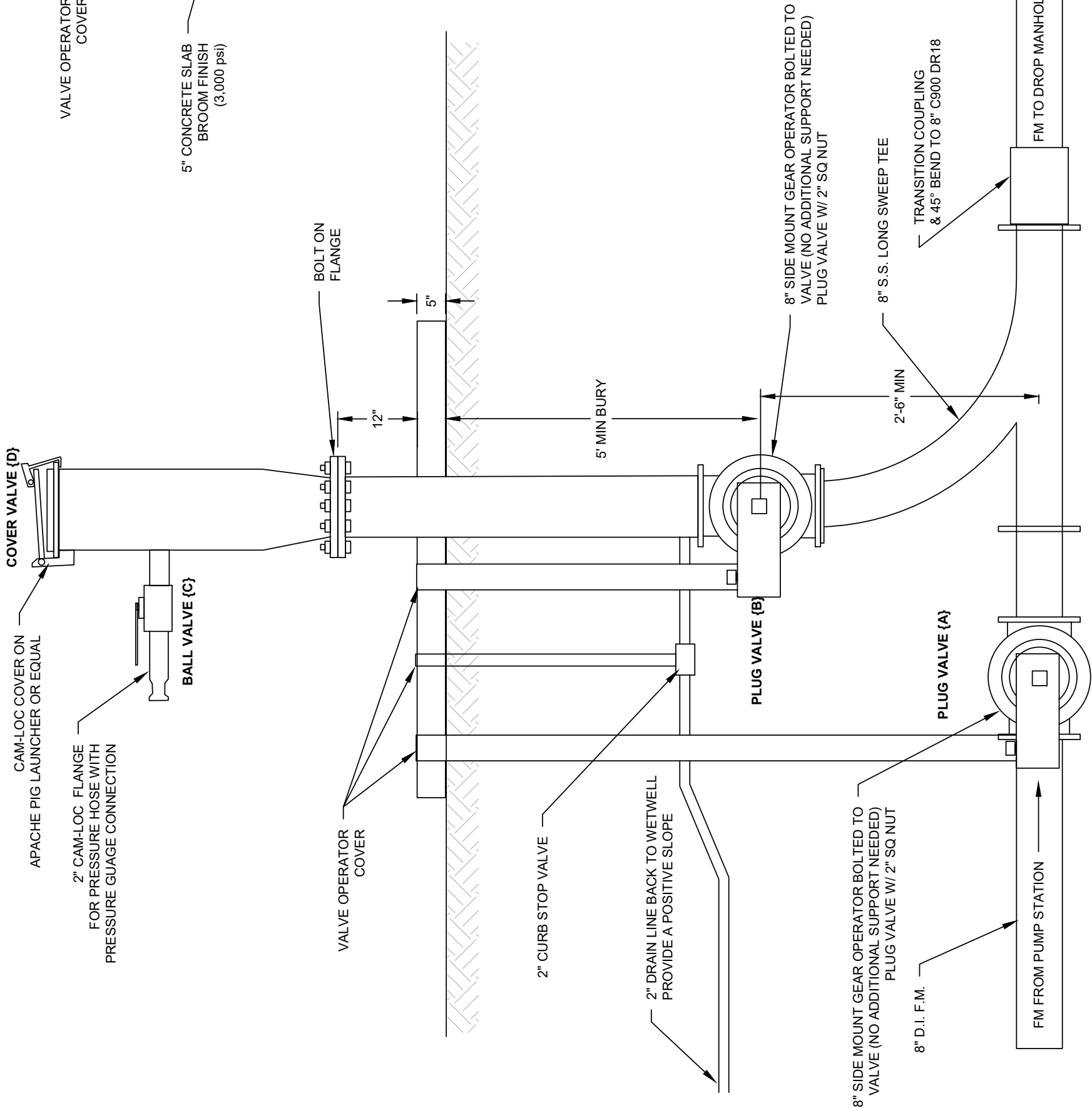
SIDE VIEW

- NOTES:
- POWER ENTRANCE INTO ENCLOSURE AND CONDUIT TO PANEL TO BE PROVIDED BY OTHERS.
 - WIRE PENETRATIONS:
 - PUMP CABLE - 1.5" COUPLING @2
 - LEVEL TRANSDUCER & FLOATS - .75" COUPLING @5
 - LIFT HOOK LOCATIONS SUBJECT TO CHANGE PER CONCRETE MANUFACTURER

ITEM	QUANTITY	DESCRIPTION
-	-	PAINT, DEVOE
19	1	SAFETY RAILING, OSHA APPROVED, REMOVALBLE RAILINGS, SS ANCHORS FOR PLATES
18	1	HAND LAMP W/ 25' CORD
17	1	PVC WET WELL VENT W/ SCREENED RAIN HOOD
16	1	VENTILATION INLET, DAYTON 2C517 LOUVER & RAIN HOOD
15	1	VENTILATION BLOWER, DAYTON 1HLA1, W/ DAYTON 2C517 LOUVER & RAIN HOOD
14	1	HEATER, 1.5 KW
-	-	
13	1	CONTROL PANEL, 42x30x10" (PROVIDED BY B&M TECHNICAL SERVICE, I INSTALLED BY DPI)
-	-	LEVEL SENSING & ALARM EQUIPMENT (PROVIDED BY B&M TECHNICAL SERVICE)
-	1	THERMOSTAT, VENTILATION BLOWER CONTROL
-	1	CONVENIENCE OUTLET
-	-	CONDUIT, PVC
-	-	
12	1	COUPLING, 4" PT QUICK CONNECT
11	1	VALVE, 1" BALL, SMITH COOPER
10	2	VALVE, 4" CHECK, PRATT 8001 W/ LEVER AND SPRING
9	3	VALVE, 4" PLUG, MILLIKEN W/ LEVER
-	-	HARDWARE, NUTS, BOLTS, GR. 2 ZINC PLATED STEEL
-	-	GASKET, RED RUBBER RING (.06")
8	3	TEE, 4x4x4" D.I.
7	1	FLANGE, 4" ANSI 150#, BLIND W/2" NPT HOLE
-	-	
6	4	FLANGE, 4" ANSI 150#, 304 STAINLESS STEEL
5	-	PIPE, 4" SCH 40, 304 STAINLESS STEEL
-	-	
4	1	PIPE PENTRATION PLATE, .30" 304 STAINLESS STEEL
3	1	BILCO DOUBLE LEAF HATCH, 48x72" WITH SAFETY GRATING OR EQUAL
2	1	ENCLOSURE, FIBERGLASS, 90x42x71", 2 DOORS, WHITE
1	1	CONCRETE BASE, 10" THICK, EMBEDDING LIFT HOOKS, LINE-X COATING



TOP VIEW AT SLAB



OPERATION PLAN FOR PIGGING OUT FORCE MAIN :

1. CLOSE VALVE {A},
2. GO TO AIR RELEASE MANHOLE & CLOSE 3" BALL VALVE.
3. CLOSE 2" DRAIN CURB STOP VALVE.
4. OPEN CAM-LOC COVER {D}, INSERT APACHE FLEX PIG, CLOSE & LOCK COVER.
5. OPEN PLUG VALVE {B},
7. CONNECT HOSE WITH PRESSURE GAUGE, OPEN 2" VALVE{C}, AND BEGIN BLOWING
PIG THROUGH FM UNTIL IT COMES OUT AT DROP MANHOLE AT END OF FORCE MAIN.
8. WHEN DONE, CLOSE 2" VALVE, DISCONNECT HOSE, CLOSE PLUG VALVE {B}
9. OPEN 2" CURB STOP DRAIN VALVE, OPEN 2" BALL VALVE{C} (ALLOW AIR IN)
10. OPEN AIR RELEASE 3" VALVE AT MANHOLE.
11. OPEN PLUG VALVE {A}
12. BEGIN USE.

LIFTSTATION #8 FORCE MAIN PIGGING SCHEMATIC

LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

FOR CONSTRUCTION
3/12/25

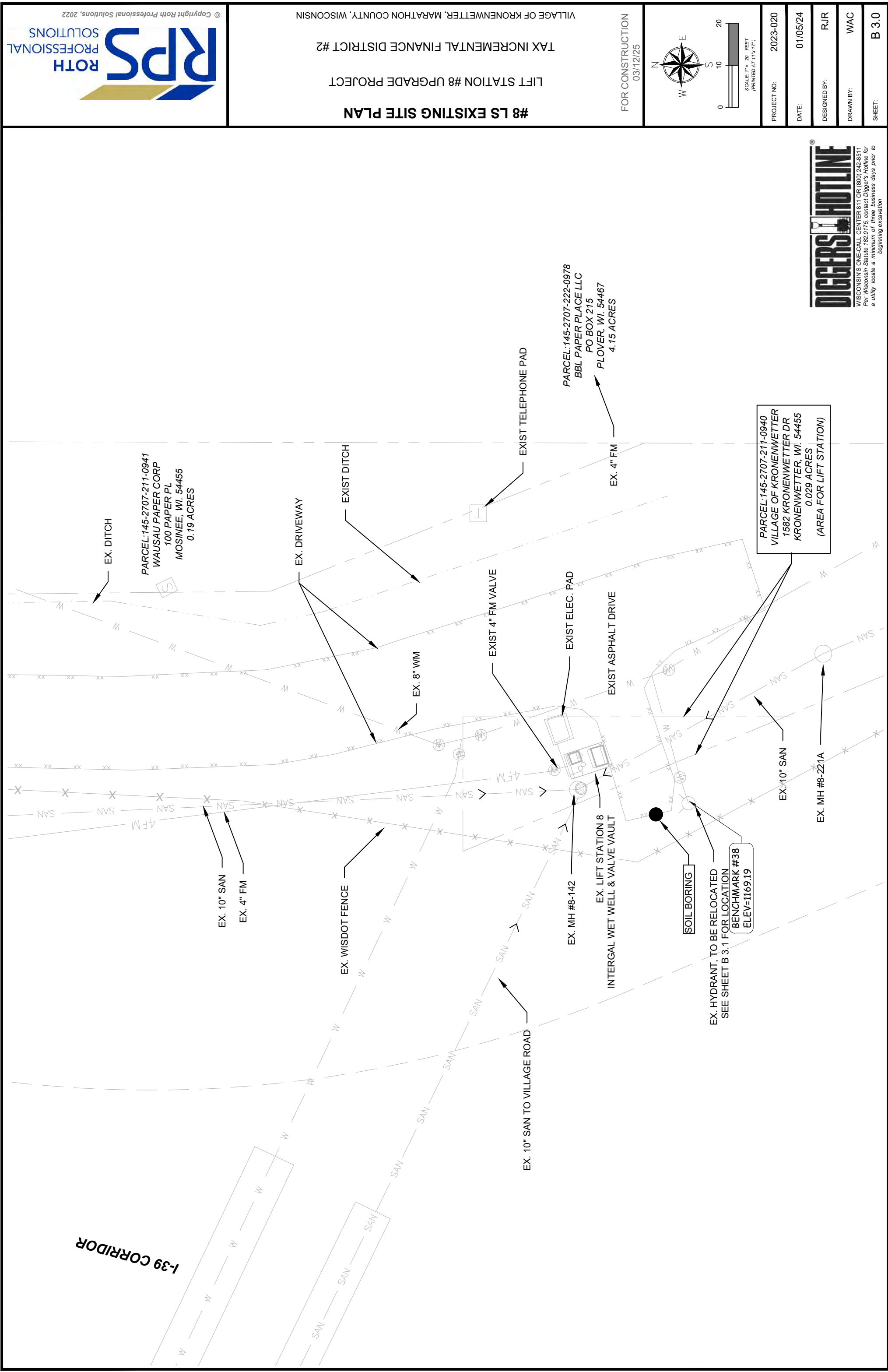
RPS
ROTH PROFESSIONAL SOLUTIONS

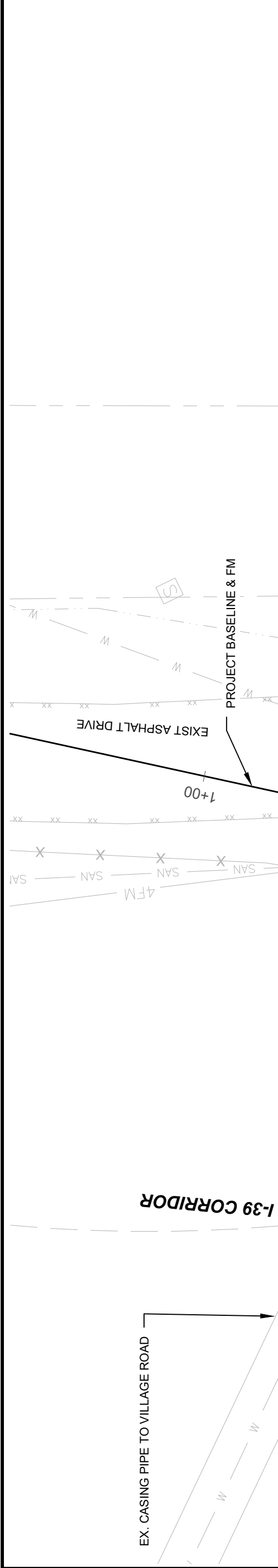
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PROJECT NO:	2023-020 (F)
DATE:	01/05/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	B 2.2

DIGGERS HOTLINE

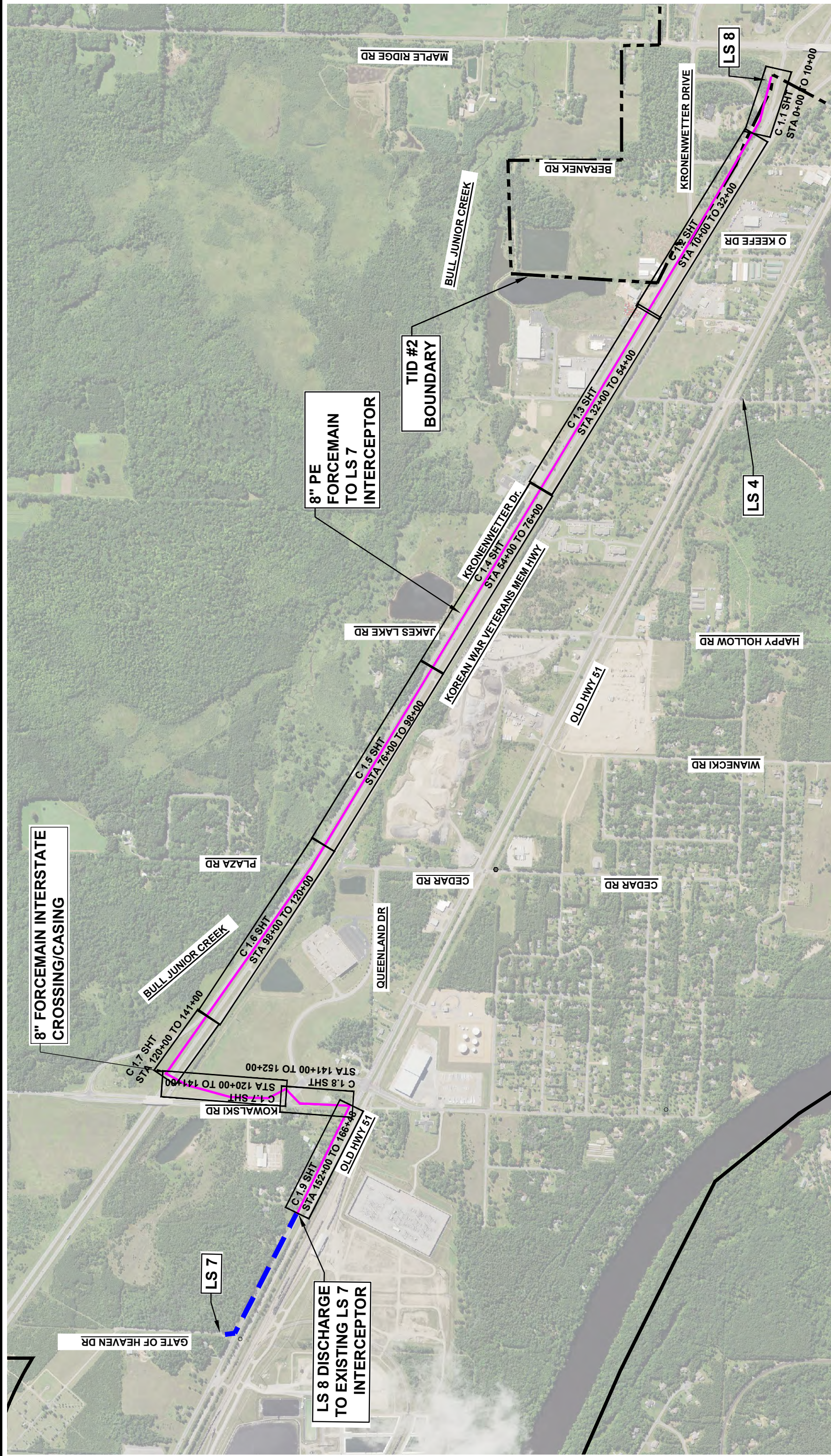
WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation





SHEET: B31

WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
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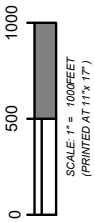
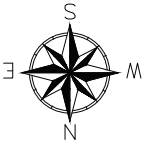


OVERALL PLAN SHEET LAYOUT

LIFT STATION #8 UPGRADE PROJECT

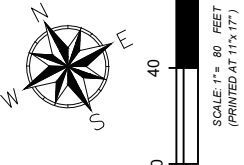
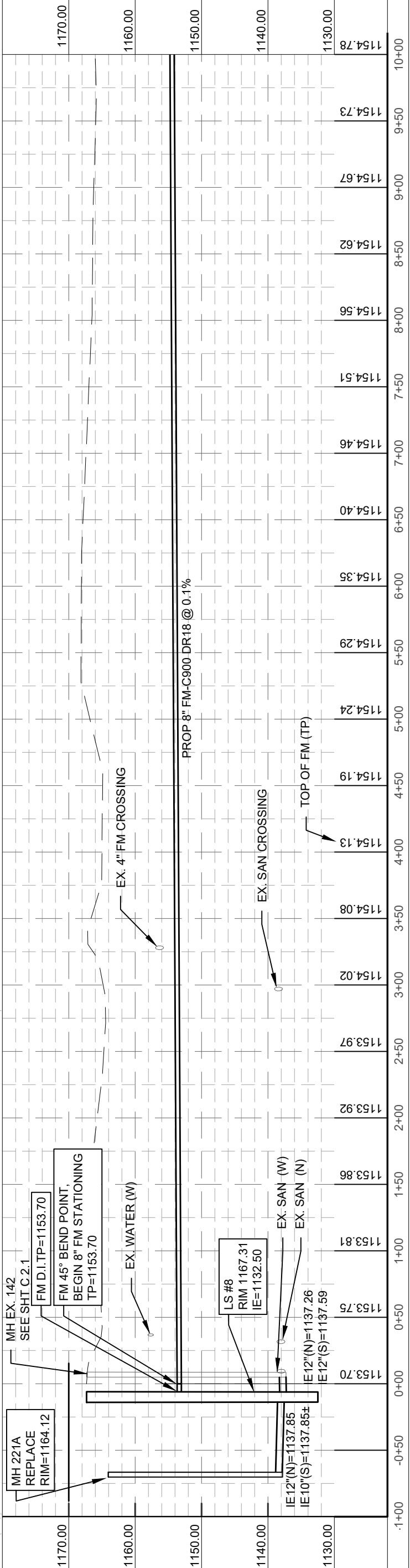
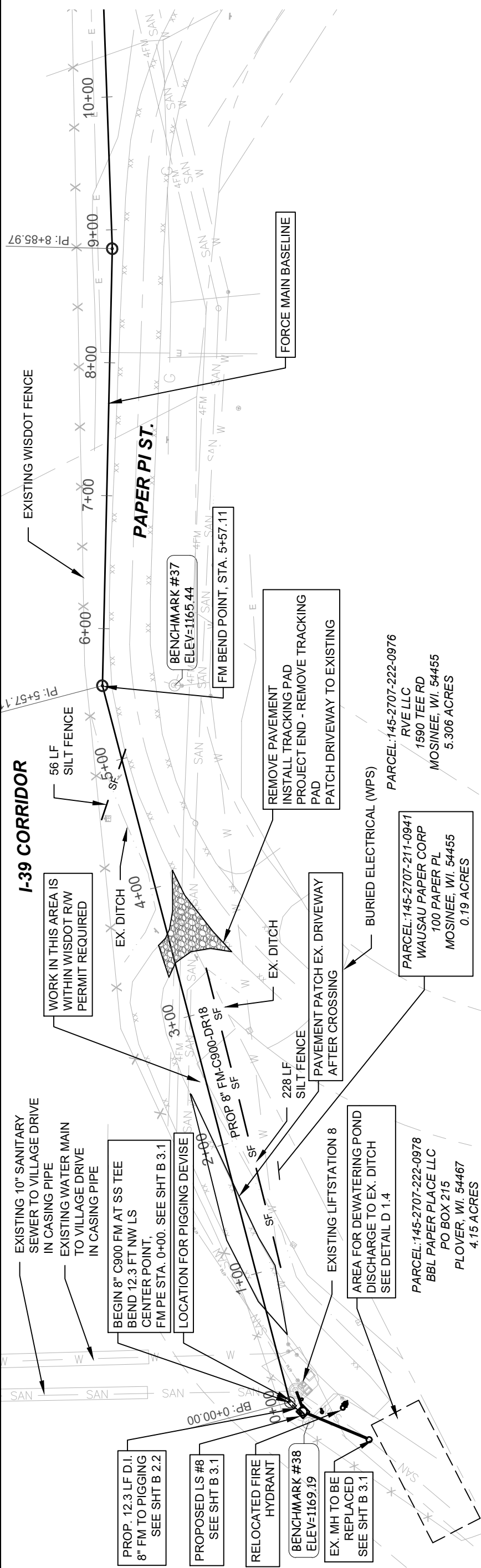
TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN



DATE:	08/01/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	C 1.0

PROJECT NO: 2023-020 (F)



PROJECT NO: 2023-020 (F)

DATE: 01/05/24

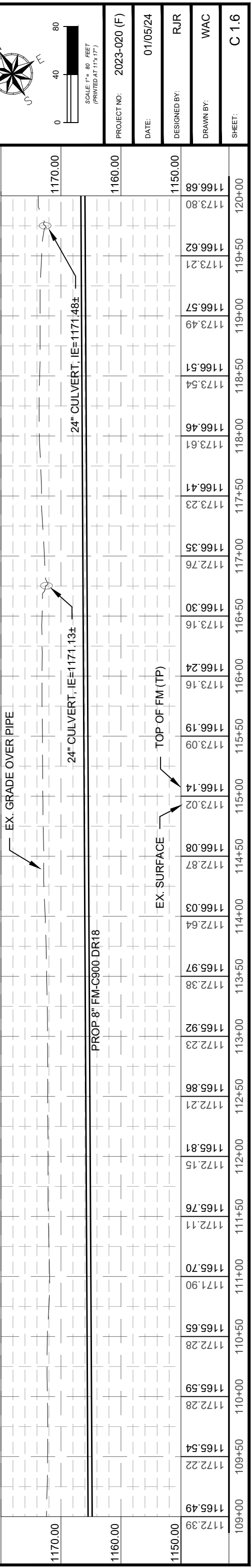
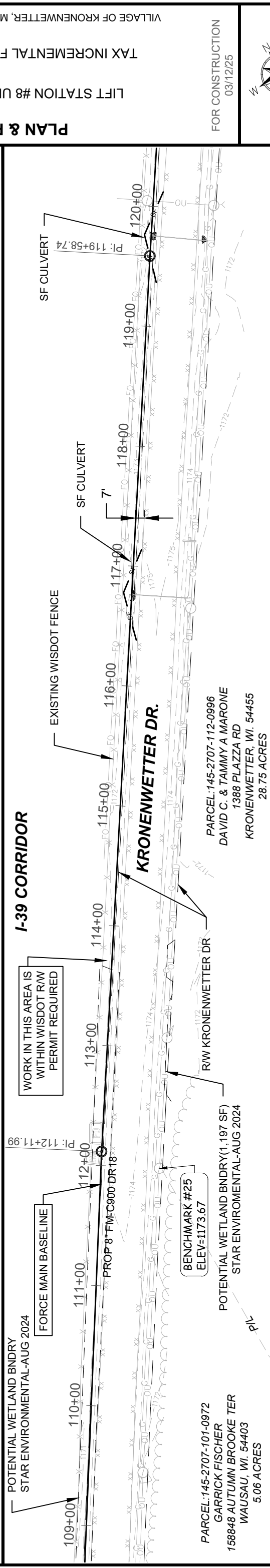
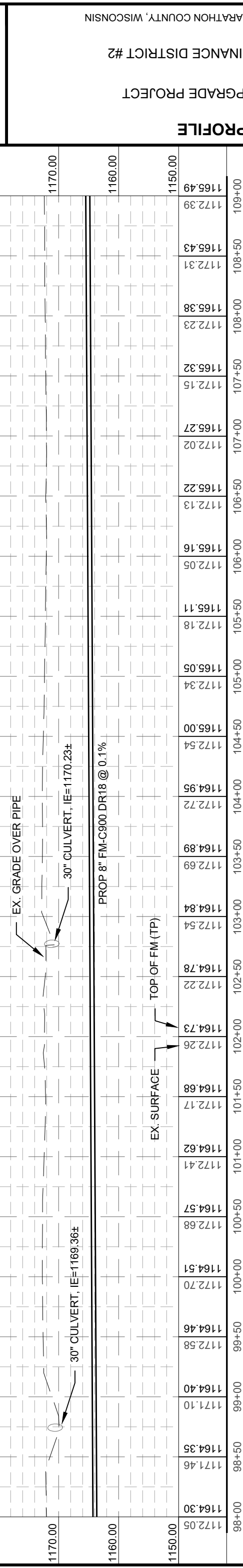
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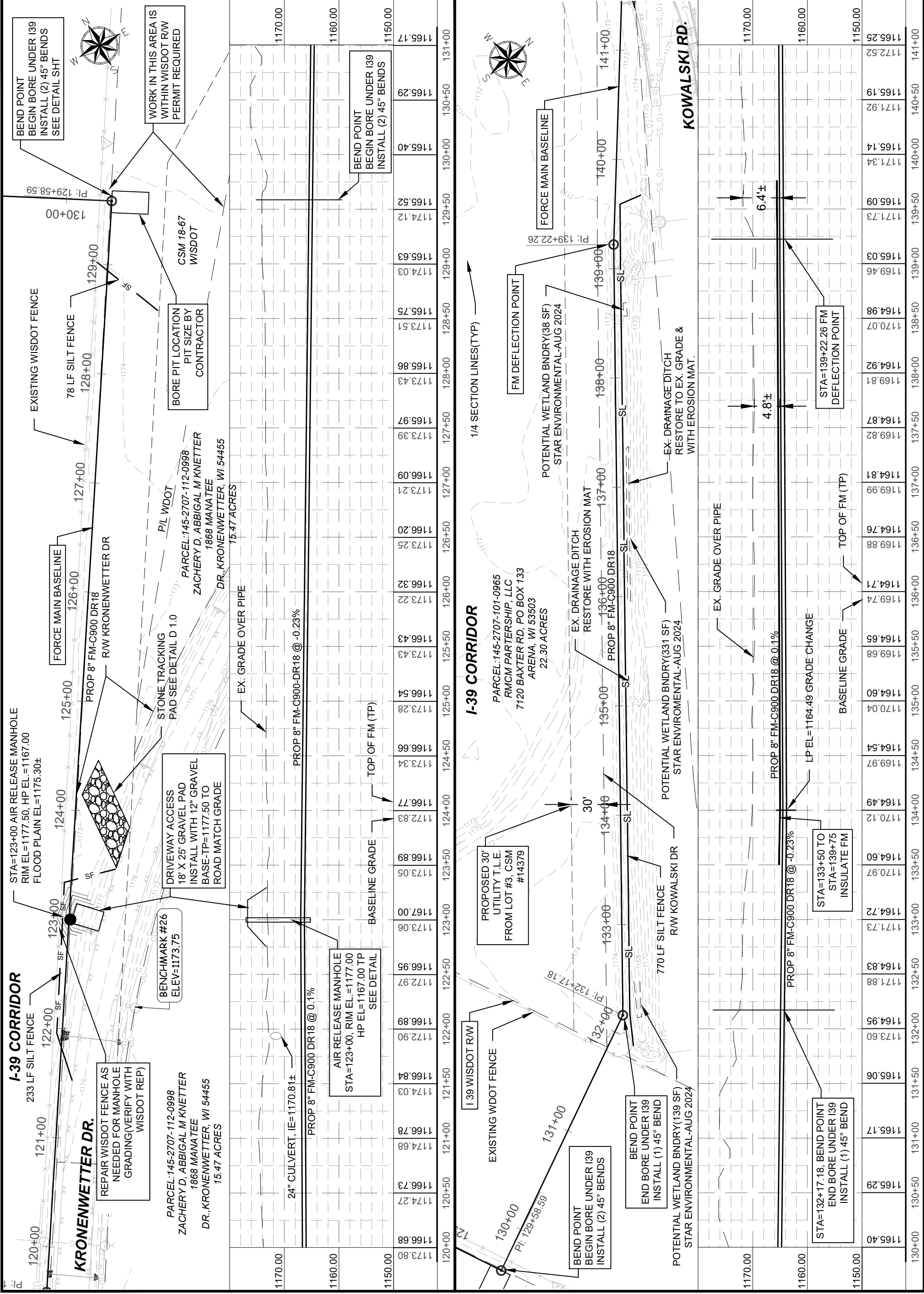
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Per Wisconsin Statute 182.0775, contact Diggers Hotline for a utility locate a minimum of three business days prior to beginning excavation

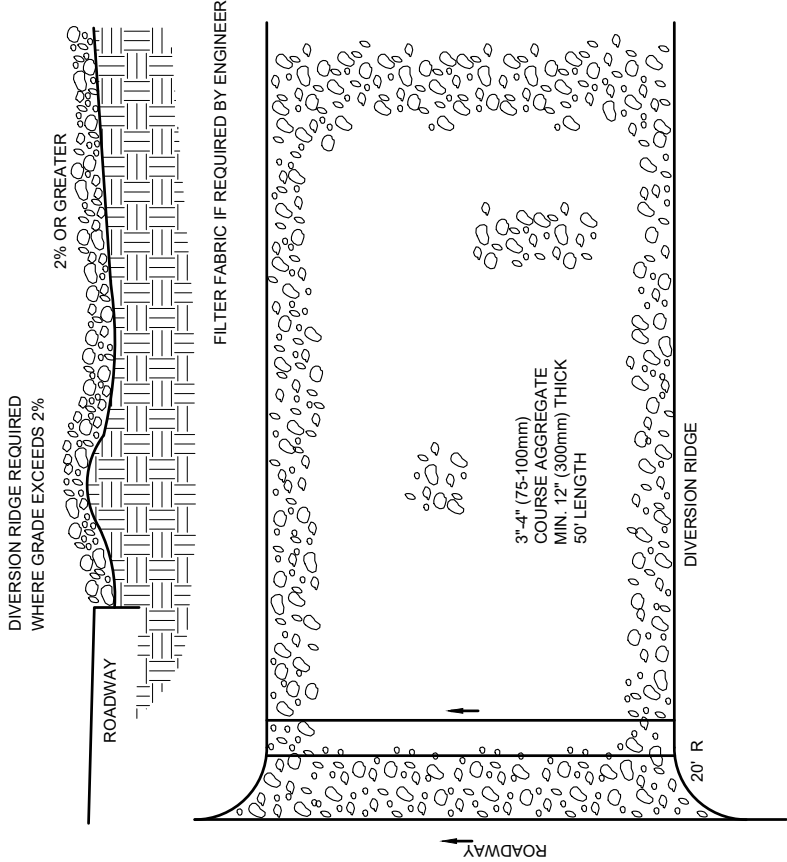
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EROSION CONTROL NOTES

1. KEEP A COPY OF THE CURRENT EROSION CONTROL PLAN ON SITE THROUGHOUT THE DURATION OF THE PROJECT.
2. CONTRACTOR IS RESPONSIBLE FOR ROUTINE SITE INSPECTIONS AT LEAST ONCE EVERY 7 DAYS AND WITHIN 24 HOURS AFTER A RAINFALL EVENT OF 0.5 INCHES OR GREATER. KEEP INSPECTION REPORTS ON-SITE AND MAKE THEM AVAILABLE UPON REQUEST.
3. INSPECT AND MAINTAIN ALL INSTALLED EROSION CONTROL PRACTICES UNTIL THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.
4. WHEN POSSIBLE, PRESERVE EXISTING VEGETATION (ESPECIALLY ADJACENT TO SURFACE WATERS), MINIMIZE LAND-DISTURBING CONSTRUCTION ACTIVITY ON SLOPES OF 20% OR MORE, MINIMIZE SOIL COMPACTION, AND PRESERVE TOPSOIL.
5. INSTALL PERIMETER EROSION CONTROLS AND ROCK TRACKING PAD CONSTRUCTION ENTRANCE(S) PRIOR TO ANY LAND-DISTURBING ACTIVITIES, INCLUDING CLEARING AND GRUBBING. USE WDNR TECHNICAL STANDARD STONE TRACKING PAD AND TIRE WASHING #1057 FOR ROCK CONSTRUCTION ENTRANCE(S).
6. INSTALL INLET PROTECTION PRIOR TO LAND-DISTURBING ACTIVITIES IN THE CONTRIBUTING DRAINAGE AREA AND/OR IMMEDIATELY UPON INLET INSTALLATION. COMPLY WITH WDNR TECHNICAL STANDARD STORM DRAIN INLET PROTECTION FOR CONSTRUCTION SITES #1060.
7. STAGE CONSTRUCTION GRADING ACTIVITIES TO MINIMIZE THE CUMULATIVE EXPOSED AREA. CONDUCT TEMPORARY GRADING FOR EROSION CONTROL PER WDNR TECHNICAL STANDARD TEMPORARY GRADING PRACTICES FOR EROSION CONTROL #1067.
8. INSTALL AND MAINTAIN SILT FENCING PER WDNR TECHNICAL STANDARD SILT FENCE #1056. REMOVE SEDIMENT FROM BEHIND SILT FENCES AND SEDIMENT BARRIERS BEFORE SEDIMENT REACHES A DEPTH THAT IS EQUAL TO ONE-HALF OF THE FENCE AND/OR BARRIER HEIGHT.
9. REPAIR BREAKS AND GAPS IN SILT FENCES AND BARRIERS IMMEDIATELY. REPLACE DECOMPOSING STRAW BALES (TYPICAL BALE LIFE IS 3 MONTHS). LOCATE, INSTALL, AND MAINTAIN STRAW BALES PER WDNR TECHNICAL STANDARD DITCH CHECKS #1062.
10. INSTALL AND MAINTAIN FILTER SOCKS IN ACCORDANCE WITH WDNR TECHNICAL STANDARD INTERIM MANUFACTURED PERIMETER CONTROL AND SLOPE INTERRUPTION PRODUCTS # 1071.
11. IMMEDIATELY STABILIZE STOCKPILES AND SURROUND STOCKPILES AS NEEDED WITH SILT FENCE OR OTHER PERIMETER CONTROL IF STOCKPILES WILL REMAIN INACTIVE FOR 7 DAYS OR LONGER.
12. IMMEDIATELY STABILIZE ALL DISTURBED AREAS THAT WILL REMAIN INACTIVE FOR 14 DAYS OR LONGER. BETWEEN SEPTEMBER 15 AND OCTOBER 15: STABILIZE WITH MULCH, TACKIFIER, AND A PERENNIAL SEED MIXED WITH WINTER WHEAT, WINTER WHEAT, ANNUAL OATS, OR ANNUAL RYE. AS APPROPRIATE FOR REGION AND SOIL TYPE. OCTOBER 15 THROUGH COLD WEATHER: STABILIZE WITH A POLYMER AND DORMANT SEED MIX, AS APPROPRIATE FOR REGION AND SOIL TYPE.
13. STABILIZE AREAS OF FINAL GRADING WITHIN 7 DAYS OF REACHING FINAL GRADE.
14. SWEEP/CLEAN UP ALL SEDIMENT/TRASH THAT MOVES OFF-SITE DUE TO CONSTRUCTION ACTIVITY OR STORM EVENTS BEFORE THE END OF THE SAME WORKDAY OR AS DIRECTED BY ENGINEER. SEPARATE SWEEPED MATERIALS (SOILS AND TRASH) AND DISPOSE OF APPROPRIATELY.
15. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST PER WDNR TECHNICAL STANDARD DUST CONTROL ON CONSTRUCTION SITES # 1068.
16. PROPERLY DISPOSE OF ALL WASTE AND UNUSED BUILDING MATERIALS (INCLUDING GARBAGE, DEBRIS, CLEANING WASTES, OR OTHER CONSTRUCTION MATERIALS) AND DO NOT ALLOW THESE MATERIALS TO BE CARRIED BY RUNOFF INTO THE RECEIVING CHANNEL.
17. FOR NON-CHANNELIZED FLOW ON DISTURBED OR CONSTRUCTED SLOPES, PROVIDE CLASS I, II, OR III TYPE (SPECIFY TYPE A, B, OR C) EROSION CONTROL MATTING. SELECT EROSION MATTING FROM APPROPRIATE EROSION CONTROL MATRIX IN WDOT'S WIDOT PRODUCT ACCEPTABILITY LIST (PAL); INSTALL AND MAINTAIN PER WDNR TECHNICAL STANDARD NON-CHANNEL EROSION MAT #1052.
18. FOR CHANNELIZED FLOW ON DISTURBED OR CONSTRUCTED AREAS, PROVIDE EROSION CONTROL MATTING AS DIRECTED BY ENGINEER. SELECT EROSION MATTING FROM APPROPRIATE MATRIX IN WDOT'S WIDOT PRODUCT ACCEPTABILITY LIST (PAL); INSTALL AND MAINTAIN PER WDNR TECHNICAL STANDARD CHANNEL EROSION MAT #1053.
19. MAKE PROVISIONS FOR WATERING DURING THE FIRST 8 WEEKS FOLLOWING SEEDING OR PLANTING OF DISTURBED AREAS WHENEVER MORE THAN 7 CONSECUTIVE DAYS OF DRY WEATHER OCCUR.
20. INSTALL ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES (SUCH AS TEMPORARY SEDIMENT BASINS, DITCH CHECKS, EROSION CONTROL MATTING, SILT FENCING, FILTER SOCKS, WATTLES, ETC.), OR AS DIRECTED BY ENGINEER.
21. NOTIFY ENGINEER IF THERE IS A DISCHARGE OF SEDIMENT AND/OR OTHER CONTAMINANTS. A SPILL PLAN IS REQUIRED IF THERE IS POTENTIAL TO DISCHARGE CONTAMINANTS TO WATERS OF THE STATE.



NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
4. IF TRACKING PAD IS FILLED WITH SEDIMENT REMOVE AND REPLACE COURSE AGGREGATE.

ROCK CONSTRUCTION ENTRANCE

BID SET 02/01/25

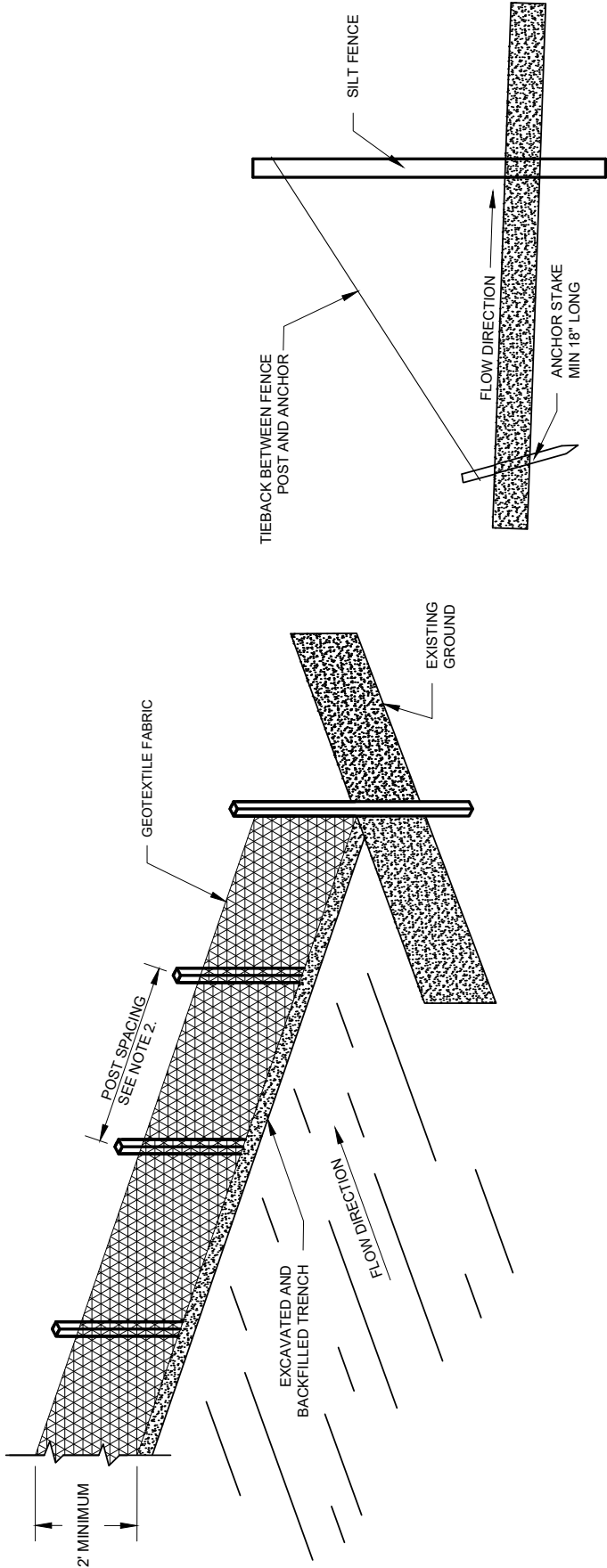
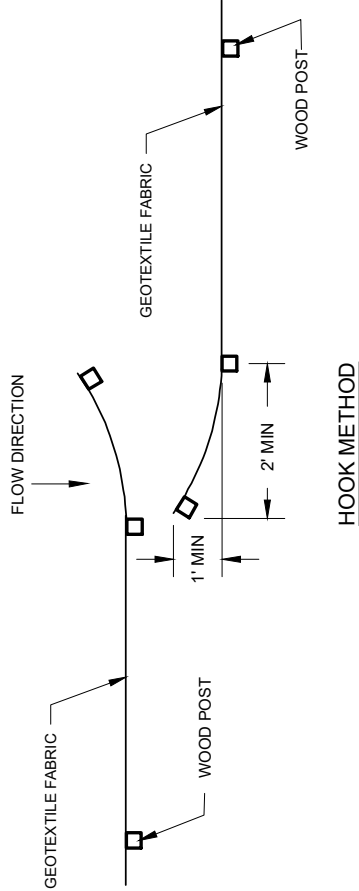
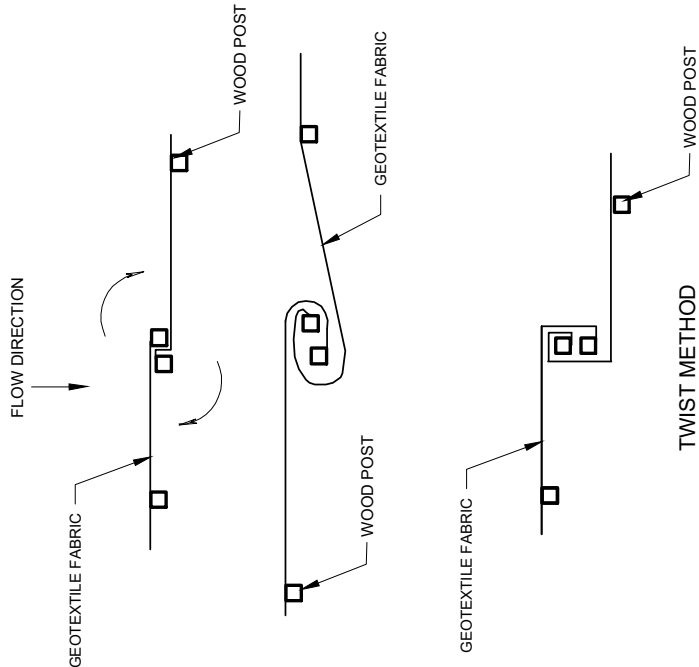
PROJECT NO:	2023-020 (F)
DATE:	10/01/23
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	D 1.0

GENERAL NOTES

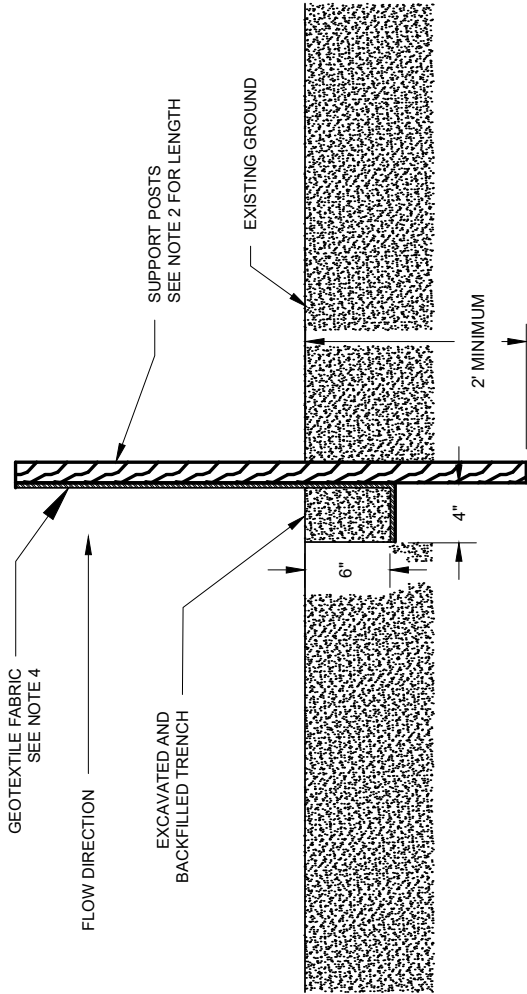
TEST REQUIREMENT	METHOD	VALUE *
MINIMUM GRAB TENSILE STRENGTH IN THE MACHINE DIRECTION	ASTM D 4632	120 LBS.
MINIMUM GRAB TENSILE STRENGTH IN THE CROSS MACHINE DIRECTION	ASTM D 4632	100 LBS.
MAXIMUM APPARENT OPENING SIZE EQUIVALENT STANDARD SIEVE	ASTM D 4751	NO. 30
MINIMUM PERMITTIVITY	ASTM D 4491	0.05 SEC ⁻¹
MAXIMUM PERMITTIVITY	ASTM D 4491	0.135 SEC. 1 OR 10 gpm/sq ft at 50 mm constant head.
MINIMUM ULTRAVIOLET STABILITY PERCENTAGE OF STRENGTH RETAINED AFTER 500 HOURS OF EXPOSURE	ASTM D 4355	70%

* ALL NUMERICAL VALUES REPRESENT MINIMUM/MAXIMUM AVERAGE ROLL VALUES. (FOR EXAMPLE, THE AVERAGE OF MINIMUM TEST RESULTS ON ANY ROLL IN A LOT SHOULD MEET OR EXCEED THE MINIMUM SPECIFIED VALUES.)

1. THE GEOTEXTILE FABRIC SHALL BE PLACED IN THE EXCAVATED TRENCH, BACKFILLED, AND COMPACTED TO THE EXISTING GROUND SURFACE.
2. WOODEN SUPPORT POSTS SHALL BE A MINIMUM DIMENSION OF 1-1/8" x 1-1/8" AIR OR KILN DRIED OF HICKORY OR OAK AND 4 FEET LONG. STEEL POSTS SHALL BE STUDDED "TEE" OR "U" TYPE WITH A MINIMUM WEIGHT OF 1.3 POUNDS PER LINEAL FOOT AND 5 FEET LONG. POST SPACING SHALL BE A MAXIMUM OF 8 FEET FOR WOVEN FABRIC AND 3 FEET FOR NON-WOVEN FABRIC.
3. THE GEOTEXTILE FABRIC SHALL BE ATTACHED DIRECTLY TO THE UPSLOPE SIDE OF WOODEN POSTS WITH 0.5 INCH STAPLES IN AT LEAST 3 PLACES, OR WITH WOODEN LATH AND NAILS. ATTACHMENT TO STEEL POSTS WILL BE BY WIRE FASTENERS OR 50 POUND PLASTIC TIE STRAPS ON THE UPSLOPE SIDE.
4. THE GEOTEXTILE FABRIC SHALL CONSIST OF EITHER WOVEN OR NON-WOVEN POLYESTER, POLYPROPYLENE, STABILIZED NYLON, POLYETHYLENE, OR POLYVINYLDENE CHLORIDE. NON-WOVEN FABRIC MAY BE NEEDLE PUNCHED, HEAT BONDED, RESIN BONDED, OR COMBINATIONS THEREOF. ALL FABRIC SHALL MEET THE FOLLOWING REQUIREMENTS:



SILT FENCE TIE BACK
(WHEN ADDITIONAL SUPPORT REQUIRED)



JOINING TWO LENGTHS OF SILT FENCE

SILT FENCE TYPICAL INSTALLATION

EROSION CONTROL DETAILS

LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2101/25

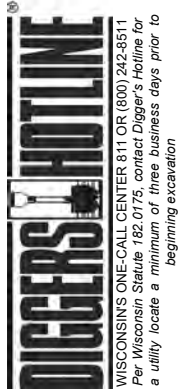
PROJECT NO: 2023-020 (F)

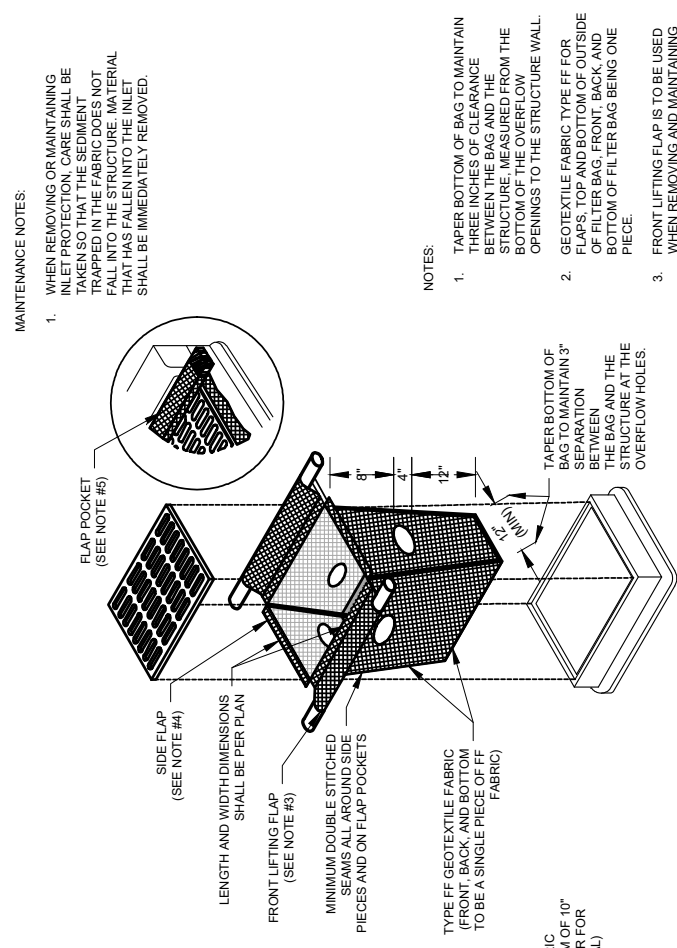
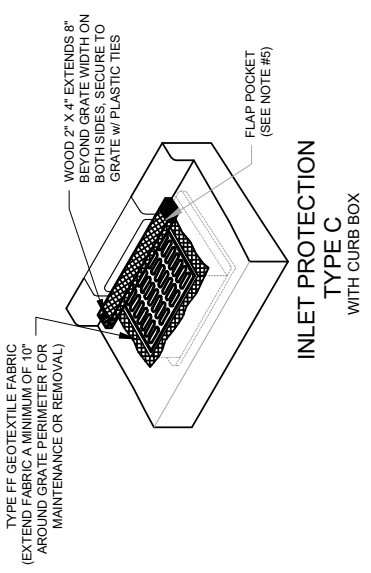
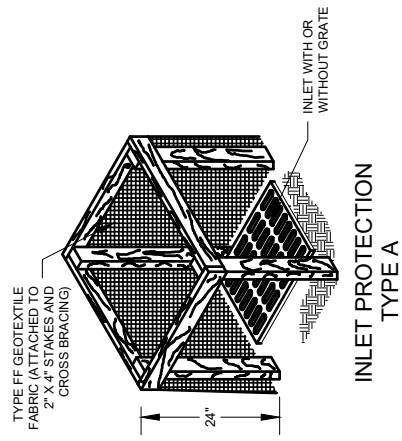
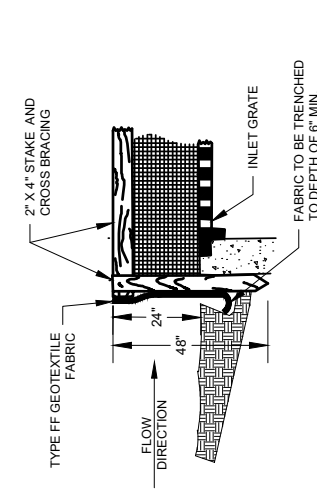
DATE: 10/01/23

DESIGNED BY: RJR

DRAWN BY: WAC

SHEET: D 1.1





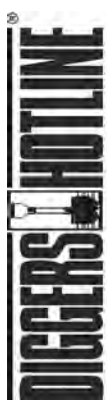
INLET PROTECTION TYPE D CAN BE INSTALLED IN INLETS WITH OR WITHOUT CURB BOXES

INLET PROTECTION TYPE B WITHOUT CURB BOX

- MAINTENANCE NOTES:
1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.
- NOTES:
1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN BOTTOM OF BAG AND THE STRUCTURE. MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
 2. GEOTEXTILE FABRIC TYPE FF FOR FLAPS, TOP AND BOTTOM OF OUTSIDE OF FILTER BAG, FRONT, BACK, AND BOTTOM OF FILTER BAG BEING ONE PIECE.
 3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
 4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
 5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" X 4". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.

INLET PROTECTION TYPES A, B, C, AND D

@ KOWALSKI & OLD 51 INLETS

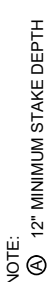
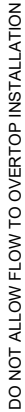


WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Diggers Hotline for a utility locate a minimum of three business days prior to beginning excavation.



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EROSION CONTROL DETAILS	LIFT STATION #8 UPGRADE	TAX INCREMENTAL FINANCE DISTRIC #2	VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN
BID SET 2/01/25			
PROJECT NO:	2023-020 (F)		
DATE:	10/01/23		
DESIGNED BY:	RJR		
DRAWN BY:	WAC		
SHEET:	D 1.2		



CHANNEL INSTALLATION

FLAT GROUND INSTALLATION

CROSS-SECTION VIEW

SECTION VIEW

APPROVED TEMPORARY DITCH CHECKS

PRODUCT	MANUFACTURER
1. Product 1	Manufacturer A
2. Product 2	Manufacturer B
3. Product 3	Manufacturer C
4. Product 4	Manufacturer D
5. Product 5	Manufacturer E
6. Product 6	Manufacturer F
7. Product 7	Manufacturer G
8. Product 8	Manufacturer H
9. Product 9	Manufacturer I
10. Product 10	Manufacturer J
11. Product 11	Manufacturer K
12. Product 12	Manufacturer L
13. Product 13	Manufacturer M
14. Product 14	Manufacturer N
15. Product 15	Manufacturer O
16. Product 16	Manufacturer P
17. Product 17	Manufacturer Q
18. Product 18	Manufacturer R
19. Product 19	Manufacturer S
20. Product 20	Manufacturer T
21. Product 21	Manufacturer U
22. Product 22	Manufacturer V
23. Product 23	Manufacturer W
24. Product 24	Manufacturer X
25. Product 25	Manufacturer Y
26. Product 26	Manufacturer Z
27. Product 27	Manufacturer AA
28. Product 28	Manufacturer AB
29. Product 29	Manufacturer AC
30. Product 30	Manufacturer AD
31. Product 31	Manufacturer AE
32. Product 32	Manufacturer AF
33. Product 33	Manufacturer AG
34. Product 34	Manufacturer AH
35. Product 35	Manufacturer AI
36. Product 36	Manufacturer AJ
37. Product 37	Manufacturer AK
38. Product 38	Manufacturer AL
39. Product 39	Manufacturer AM
40. Product 40	Manufacturer AN
41. Product 41	Manufacturer AO
42. Product 42	Manufacturer AP
43. Product 43	Manufacturer AQ
44. Product 44	Manufacturer AR
45. Product 45	Manufacturer AS
46. Product 46	Manufacturer AT
47. Product 47	Manufacturer AU
48. Product 48	Manufacturer AV
49. Product 49	Manufacturer AW
50. Product 50	Manufacturer AX
51. Product 51	Manufacturer AY
52. Product 52	Manufacturer AZ
53. Product 53	Manufacturer BA
54. Product 54	Manufacturer BB
55. Product 55	Manufacturer BC
56. Product 56	Manufacturer BD
57. Product 57	Manufacturer BE
58. Product 58	Manufacturer BF
59. Product 59	Manufacturer BG
60. Product 60	Manufacturer BH
61. Product 61	Manufacturer BI
62. Product 62	Manufacturer BJ
63. Product 63	Manufacturer BK
64. Product 64	Manufacturer BL
65. Product 65	Manufacturer BM
66. Product 66	Manufacturer BN
67. Product 67	Manufacturer BO
68. Product 68	Manufacturer BP
69. Product 69	Manufacturer BQ
70. Product 70	Manufacturer BR
71. Product 71	Manufacturer BS
72. Product 72	Manufacturer BT
73. Product 73	Manufacturer BU
74. Product 74	Manufacturer BV
75. Product 75	Manufacturer BW
76. Product 76	Manufacturer BX
77. Product 77	Manufacturer BY
78. Product 78	Manufacturer BZ
79. Product 79	Manufacturer CA
80. Product 80	Manufacturer CB
81. Product 81	Manufacturer CC
82. Product 82	Manufacturer CD
83. Product 83	Manufacturer CE
84. Product 84	Manufacturer CF
85. Product 85	Manufacturer CG
86. Product 86	Manufacturer CH
87. Product 87	Manufacturer CI
88. Product 88	Manufacturer CJ
89. Product 89	Manufacturer CK
90. Product 90	Manufacturer CL
91. Product 91	Manufacturer CM
92. Product 92	Manufacturer CN
93. Product 93	Manufacturer CO
94. Product 94	Manufacturer CP
95. Product 95	Manufacturer CQ
96. Product 96	Manufacturer CR
97. Product 97	Manufacturer CS
98. Product 98	Manufacturer CT
99. Product 99	Manufacturer CU
100. Product 100	Manufacturer CV

INSTALLATION INSTRUCTIONS-LOGS AND WATTLES

1. **SITE PREPARATION:** PREPARE SITE TO DESIGN PROFILE AND GRADE. REMOVE DEBRIS, ROCKS, CLODS, ETC. GROUND SURFACE SHOULD BE SMOOTH PRIOR TO INSTALLATION TO ENSURE LOG REMAINS IN CONTACT WITH SLOPE.
2. **STAPLE SELECTION:** AT A MINIMUM, 1" LONG BY 1" BY 24". STAKES ARE TO BE USED TO SECURE THE LOG TO THE GROUND SURFACE. INSTALLATION IN ROCKY, SANDY OR OTHER LOOSE SOIL MAY REQUIRE LONGER STAKES.
3. **SLOPE INSTALLATION:** PLACE RECP ALONG SLOPE TO PROVIDE UPSTREAM APRON FOR LOG. SECURE RECP ACCORDING TO STANDARD SLOPE INSTALLATION INSTRUCTIONS INCLUDING UPSTREAM ANCHOR TRENCH. SECURE LOG TO BLANKET. ENSURING LOG REMAINS IN INTIMATE CONTACT WITH THE RECP OVER THE LENGTH OF THE INSTALLATION. A MINIMUM ONE FOOT UPSTREAM APRON AND TWO FOOT DOWNSTREAM APRON ARE REQUIRED FOR INSTALLATION. SUBSEQUENT, DOWNSLOPE ROWS OF LOGS SHOULD BE SPACED APPROPRIATELY FOR SITE CONDITIONS TO MINIMIZE ACCELERATION OF FLOW. FURTHER, LOG SEAMS ARE TO BE OFFSET TO ENSURE CONTINUOUS FILTRATION. FIGURE A PRESENTS A SCHEMATIC OF A SLOPE INSTALLATION IN PROFILE VIEW.
4. **CHANNEL INSTALLATION:** PLACE RECP ALONG CHANNEL TO PROVIDE UPSTREAM AND DOWNSTREAM APRON FOR LOG IDENTICALLY TO SLOPE INSTALLATION. SECURE LOG TO BLANKET. ENSURING LOG REMAINS IN INTIMATE CONTACT WITH THE RECP OVER THE LENGTH OF THE INSTALLATION. A MINIMUM OF ONE FOOT UPSTREAM APRON AND TWO FOOT DOWNSTREAM APRON ARE REQUIRED FOR INSTALLATION. SUBSEQUENT, DOWNSLOPE ROWS OF LOGS SHOULD BE SPACED APPROPRIATELY FOR SITE CONDITIONS TO MINIMIZE ACCELERATION OF FLOW. FURTHER, LOG SEAMS ARE TO BE OFFSET TO ENSURE CONTINUOUS FILTRATION. FIGURE A AND FIGURE C PRESENT A SCHEMATIC OF A CHANNEL INSTALLATION.
5. **DRAIN FILTER INSTALLATION:** SURROUND DRAIN INLET TO BE PROTECTED WITH LOG. ENSURING SEAMS ARE OVERLAPPING TO MINIMIZE FLOW CIRCUMVENTING LOG. SECURE LOGS TO GROUND SURFACE ENSURING THE LOG REMAINS IN INTIMATE CONTACT WITH THE GROUND SURFACE OVER THE ENTIRE INSTALLATION. PROVIDE RECP APRON SECURED TO THE GROUND SURFACE BETWEEN DRAIN AND LOG.

TEMPORARY DITCH CHECKS

PURPOSE & CREATION: PRODUCTS IN THIS CATEGORY ARE INTENDED FOR USE AT THE BOTTOM OF FILL SLOPES AND IN CHANNELS TO INTERCEPT AND POND SEDIMENT-LADEN RUNOFF. PONDING THE WATER REDUCES THE VELOCITY OF THE INCOMING FLOW AND ALLOWS MOST OF SEDIMENTS TO SETTLE OUT. WATER EXITS THE CHECK BY EITHER FILTERING THROUGH OR FLOWING OVER THE TOP.

CONSTRUCTION METHODS: THIS WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR HIGHWAY AND STRUCTURE CONSTRUCTION AND THE STANDARD DETAIL DRAWING IN THE WISDOT FACILITY DEVELOPMENT MANUAL, IN ADDITION TO THE ABOVE.

TEMPORARY DITCH CHECKS SHALL BE PLACED PERPENDICULAR TO THE FLOW LINE OF THE DITCH AND SHALL EXTEND FAR ENOUGH SO THAT THE GROUND LEVEL AT THE ENDS OF THE CHECKS ARE HIGHER THAN THE LOW POINT OF THE CREST OF THE DITCH. THE INSTALLED MATERIAL SHALL HAVE A MINIMUM HEIGHT OF 10 INCHES ABOVE THE FLOW LINE IN THE INSTALLED POSITION. THE CHECKS SHALL BE PLACED AT A MINIMUM OF 2 INCHES ON BARE SOIL. DITCH CHECKS INSTALLED IN A CHANNEL THAT IS CONTINUOUSLY LINED WITH EROSION MAT NEED NOT BE ENTRENCHED IF INSTALLED OVER THE TOP OF THE EROSION MAT. INSTALLATIONS SHALL HAVE STACKS ON THE DOWNSTREAM SIDE OF THE TEMPORARY DITCH CHECK AND SHALL NOT REDUCE THE HEIGHT OF THE TEMPORARY DITCH CHECK. FABRIC TYPE PRODUCTS MAY BE ENTRENCHED WITH A NARROW CHECK SLOT ON THE UPSTREAM SIDE.

APPROVED MANUFACTURED ALTERNATIVES TO THE DEPARTMENT'S DETAILS ARE LISTED BELOW.

SILT LOG DETAILS

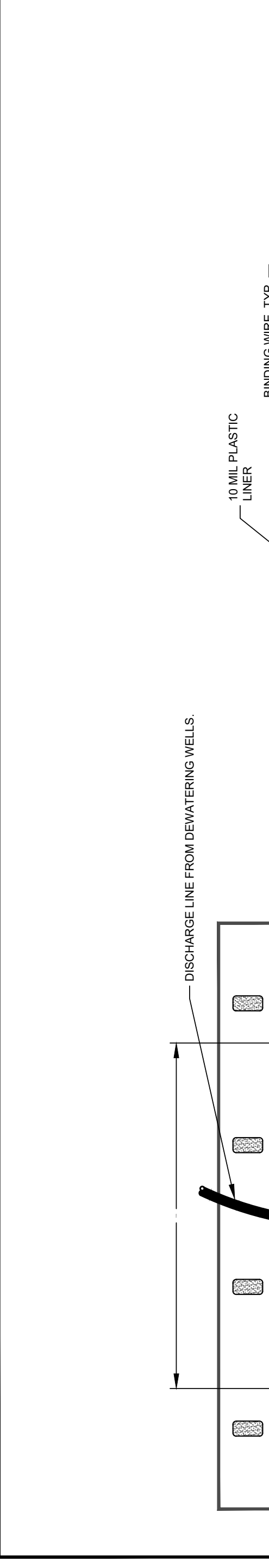
LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/01/25

PROJECT NO:	2023-020 (F)
DATE:	07/24/2024
DESIGNED BY:	RJR
DRAWN BY:	CSS
SHEET:	D 1.3



PLAN

BASIN SIZE INSIDE = DETERMINED
BY CONTRACTOR FOLLOWING
WISCONSIN CODE 1061

NOTES:

1. ALTERNATIVE MATERIALS OR SYSTEMS FOR GROUND WATER WASHOUTS ARE ALLOWABLE AS APPROVED BY ENGINEER, INCLUDING DISPOSABLE WASHOUTS, ETC.-ACTUAL SIZE SHALL BE DETERMINED BY AMOUNT OF GROUNDWATER PUMPING PLAN BY CONTRACTOR.
2. TWO SPILLWAY GABIONS WITH 1" TO 3" STONE FILLED SHALL BE USED AS FAR AWAY FROM INLET PUMP HOSE AS POSSIBLE.
3. PLASTIC LINING MATERIAL WILL BE MINIMUM OF 10 MIL POLYETHYLENE SHEETING AND WILL BE FREE OF HOLES, TEARS, OR OTHER DEFECTS.
4. WHEN WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR WORK, THE SITE SHALL HAVE SEDIMENT REMOVED AND RESTORE TO BEFORE CONSTRUCTION CONDITION.

GROUND WATER PUMP DISCHARGE BASIN

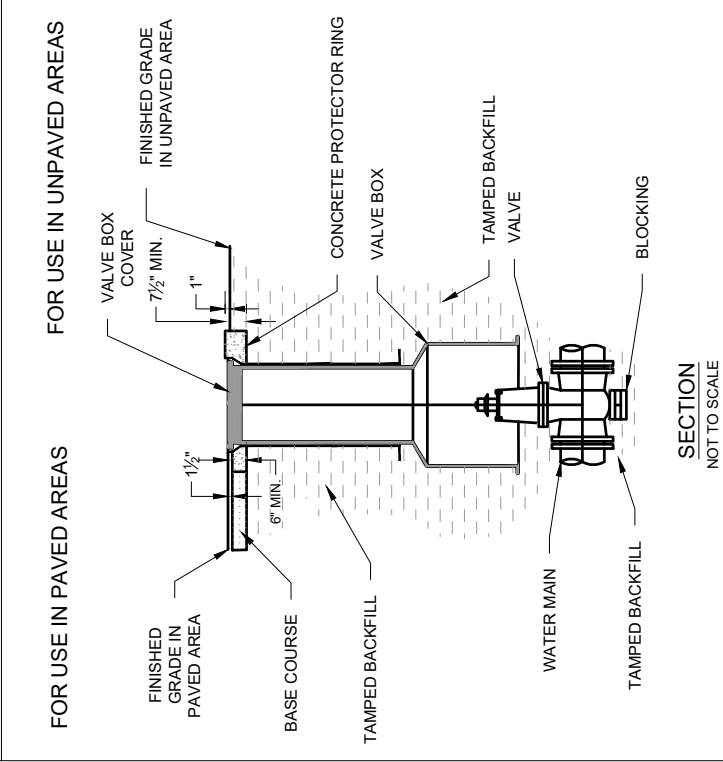
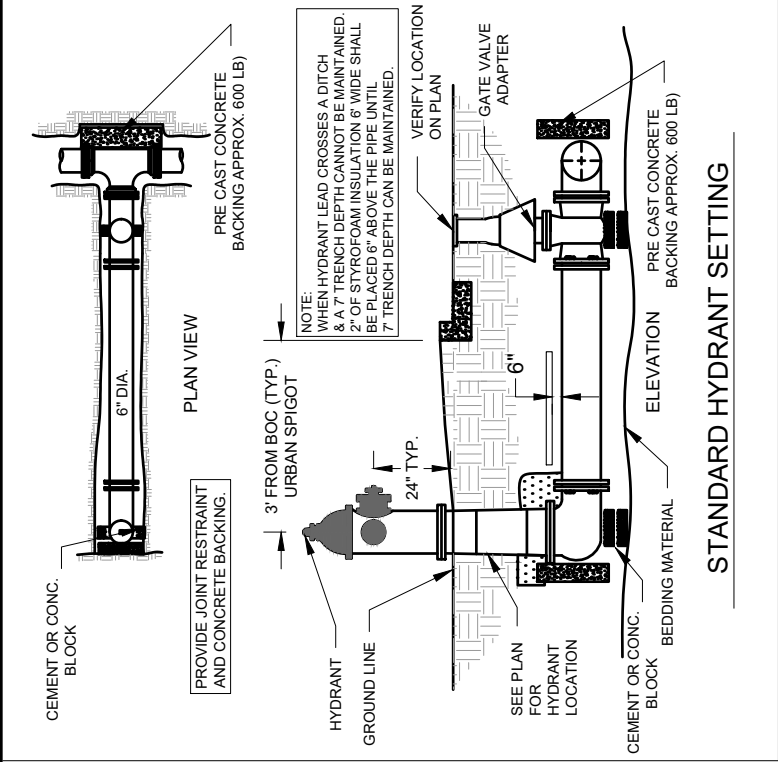
LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

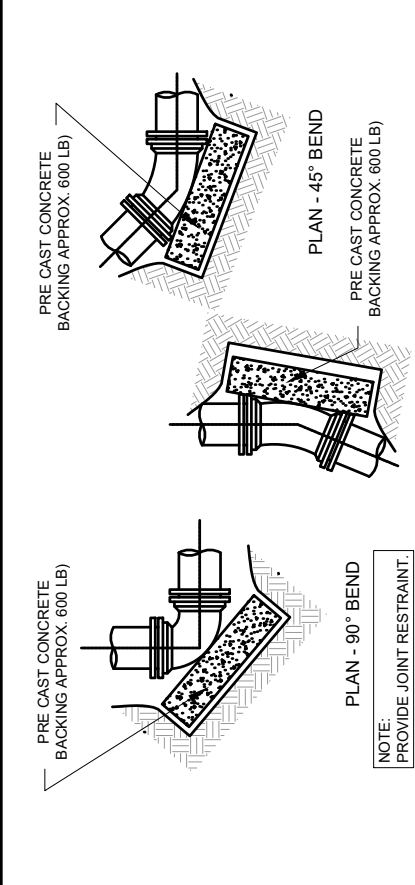
BID SET 2/01/25

PROJECT NO:	2023-020 (F)
DATE:	07/24/2024
DESIGNED BY:	RJR
DRAWN BY:	CSS
SHEET:	D 1.4



- NOTES:
1. D.I.P. MAY BE USED FOR VALVE BOX EXTENSIONS.
 2. VALVE BOX SHOULD NOT CONTACT WATER MAIN OR VALVE
 3. CONCRETE PROTECTOR RING SHALL BE USED IN ALL UNPAVED AREAS.
 4. ALL MATERIALS USED IN THE POTABLE WATER SYSTEM MUST BE NSF61 AND NSF372 CERTIFIED AND MEET THE LATEST FEDERAL SAFE DRINKING WATER ACT REQUIREMENTS.

VALVE AND VALVE BOX INSTALLATION

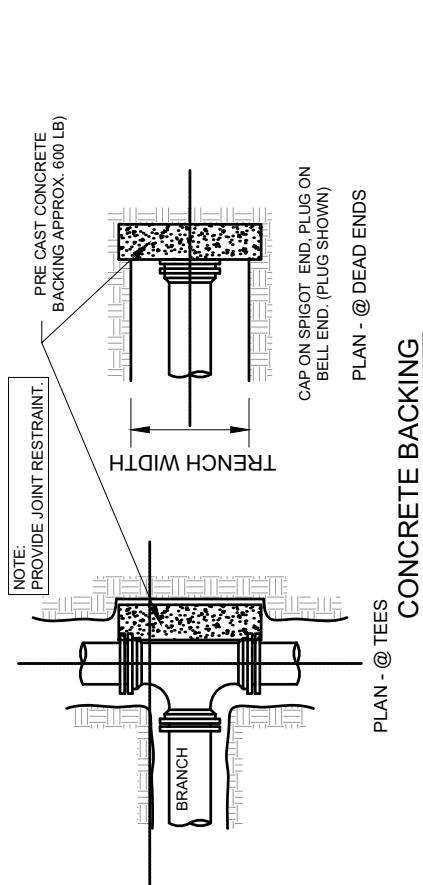


CONCRETE BACKING FOR BENDS

NOTES:

1. CONCRETE SHALL BE 3,000 PSI MIN.
2. CONCRETE FOR THRUST BLOCKING SHALL BE KEPT FAIRLY DRY. THIS MAKING THE CONCRETE WEDGE SHAPE MORE EASILY FORMED WITH THE WIDEST PART (BLOCKING AREA) AGAINST UNDISTURBED SOIL.
3. NO CONCRETE SHALL COVER ANY BOLTS OR GLANDS.
4. ALL FITTING AND ACCESSORIES TO BE WRAPPED WITH 10 MIL POLYETHYLENE PRIOR TO POURING BLOCKING.
5. VOLUME OF THRUST BLOCKING SHALL BE AS SHOWN ON THE THRUST BLOCKING SCHEDULE.

PIPE SIZE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEE	ELUG
	A	B	A	B	A	B
4"	6"	6"	6"	6"	8"	10"
6"	10"	12"	8"	8"	8"	10"
8"	15"	12"	10"	8"	8"	10"
10"	16"	14"	10"	12"	10"	14"
12"	20"	16"	12"	14"	12"	16"
14"	22"	18"	14"	16"	14"	18"
16"	26"	20"	16"	18"	16"	20"
20"	36"	28"	24"	18"	13"	12"
24"	46"	38"	30"	21"	18"	15"
					21"	21"
					24"	24"
					28"	28"
					36"	36"



INSTALLATION:

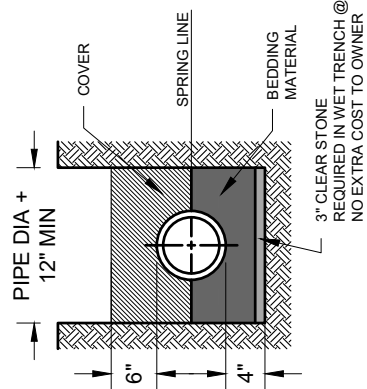
PLACE 4" OF BEDDING MATERIAL BENEATH PIPE. PLACE BEDDING MATERIAL AROUND THE PIPE TO THE SPRING LINE. WORK THE MATERIAL IN AND AROUND THE PIPE BY HAND TO PROVIDE UNIFORM SUPPORT. PLACE COVER MATERIAL CAREFULLY TO A LEVEL 6" ABOVE THE PIPE.

BEDDING AND COVER:

CLASS 1A - CLEAN, ANGULAR CRUSHED STONE, CRUSHED ROCK, OR CRUSHED GRAVEL CONFORMING TO THE FOLLOWING GRADATION:

SIZE	% PASSING BY WEIGHT
1"	100
¾"	90-100
¾"	20-55
NO. 4	5-10
NO. 8	0-5

STANDARD WATER MAIN TRENCH



DIGGERS HOTLINE

WISCONSIN ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation

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WATER MAIN DETAILS

LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/01/25

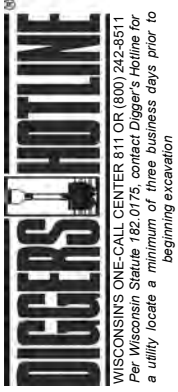
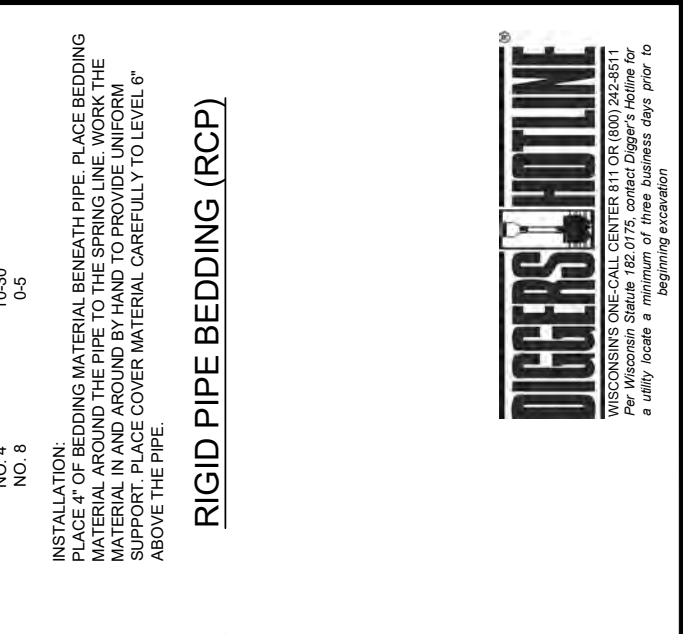
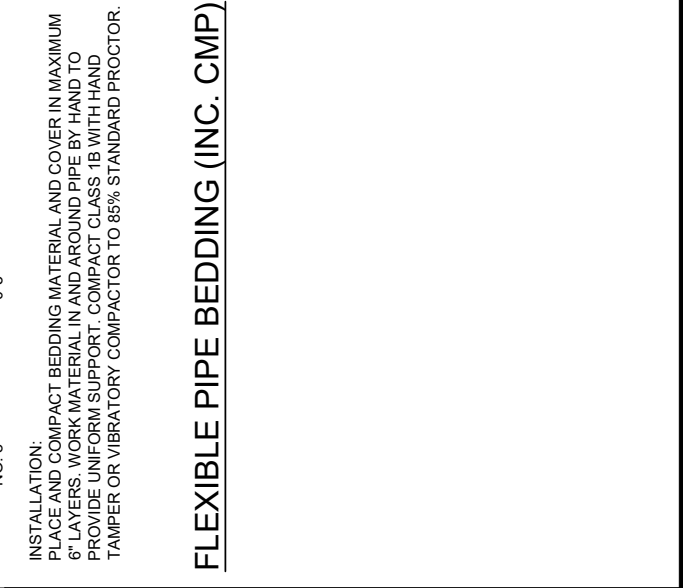
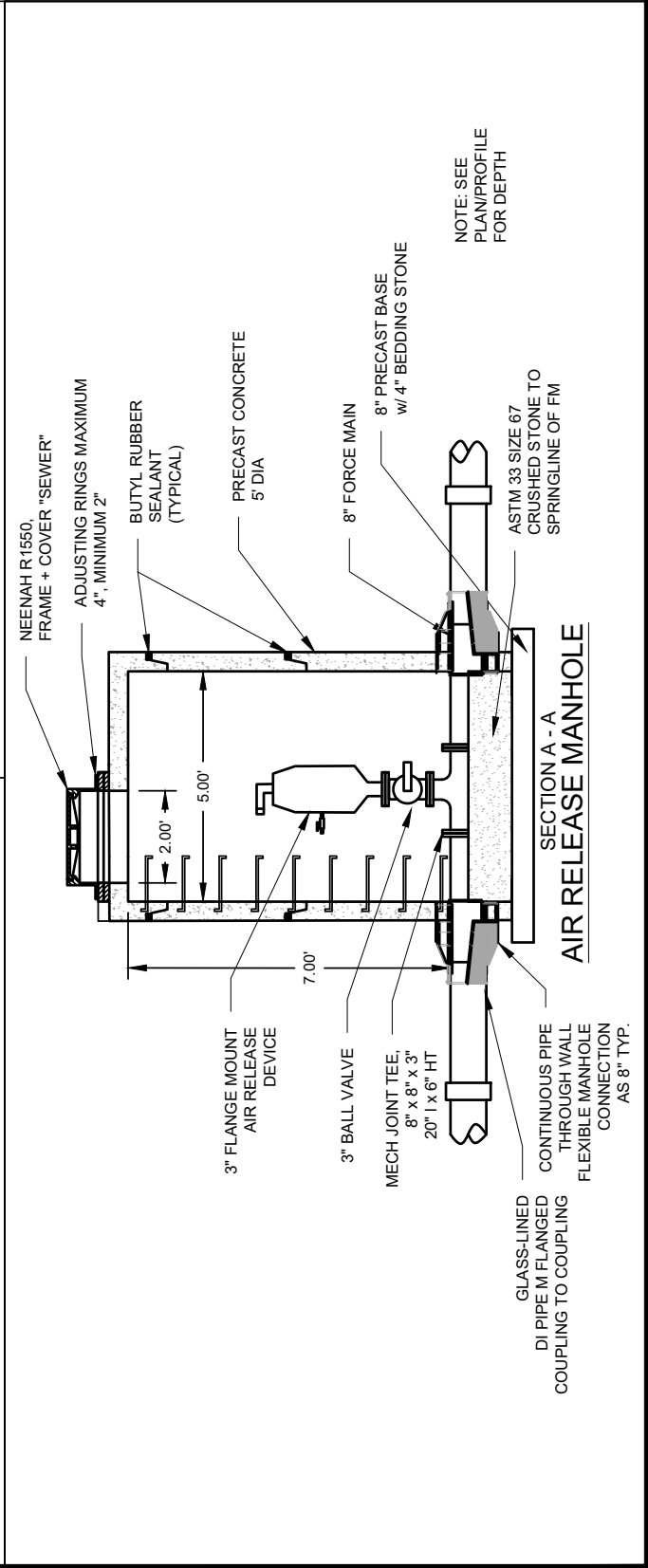
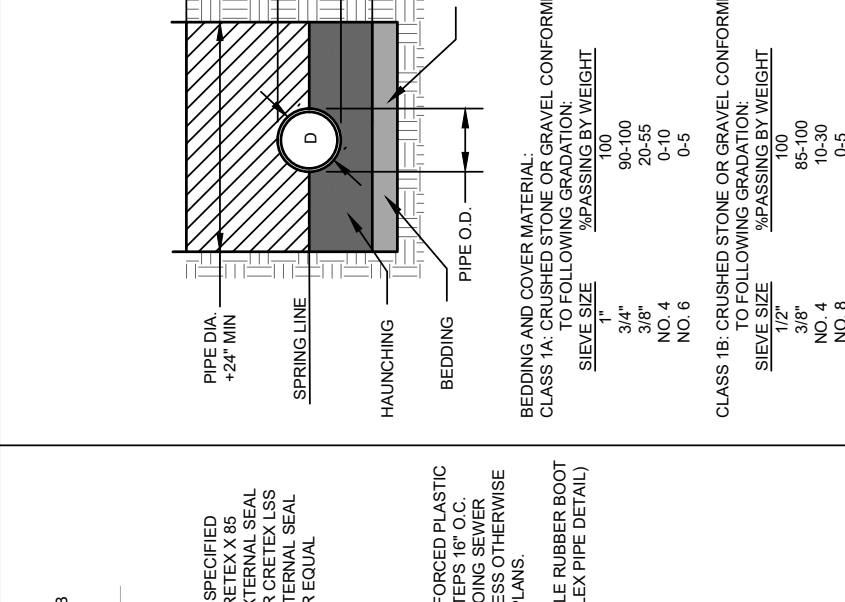
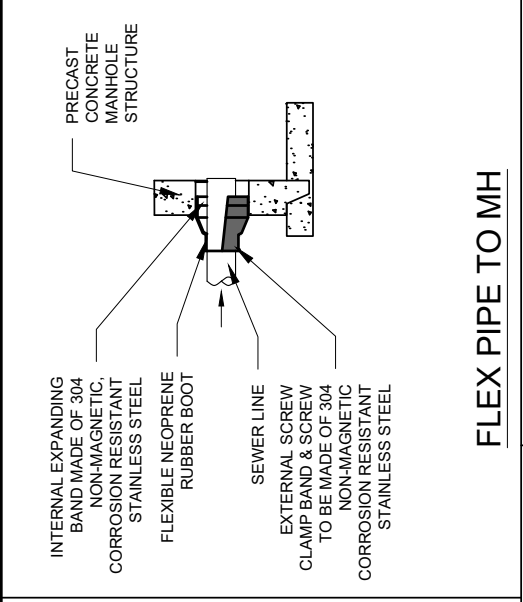
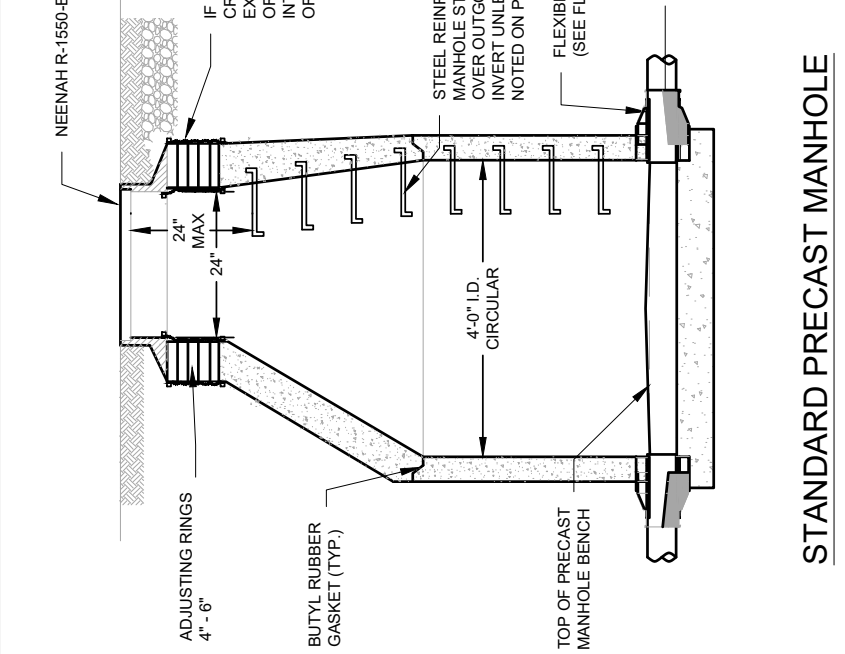
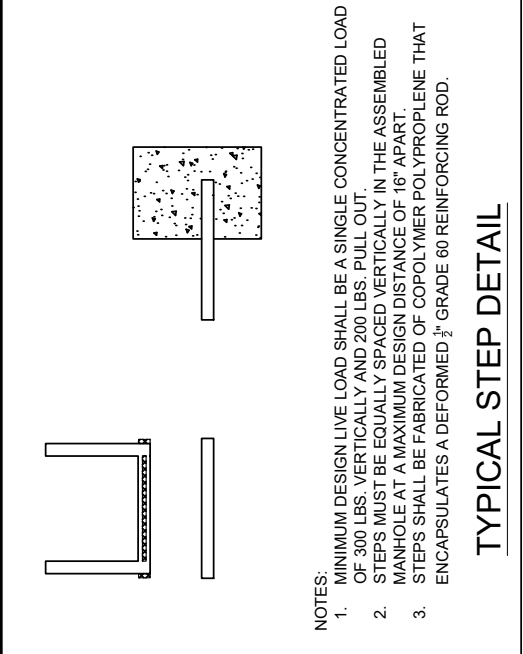
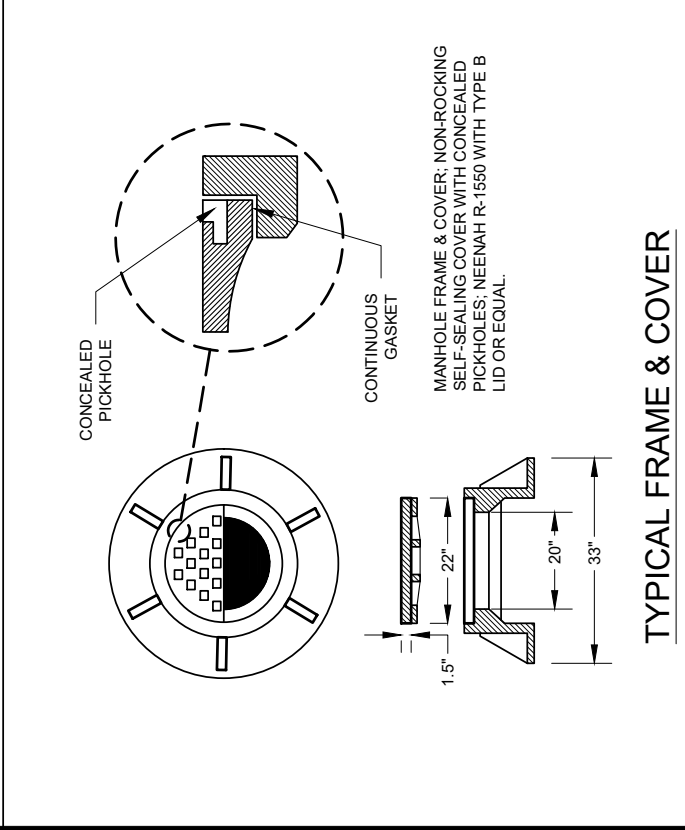
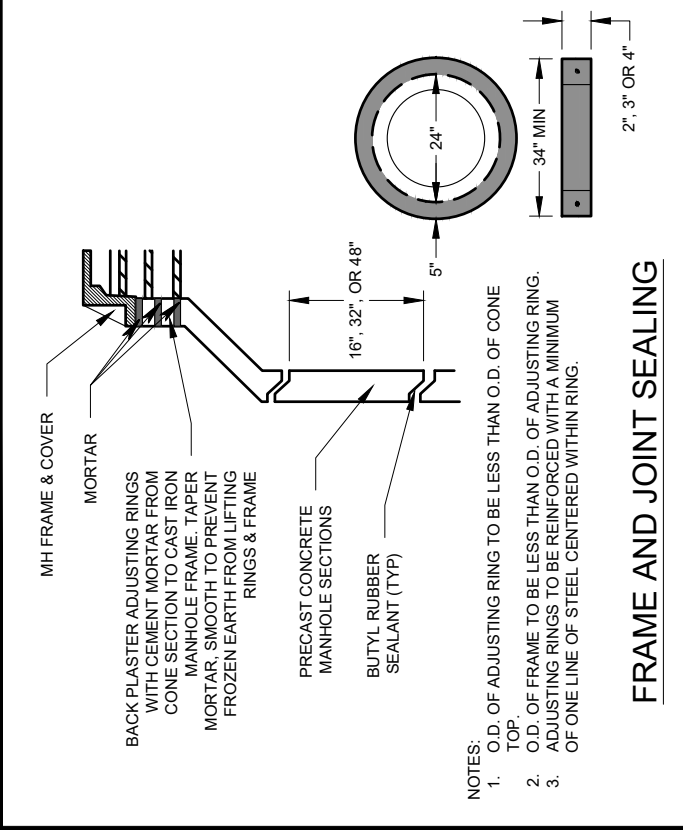
PROJECT NO: 2023-020 (F)

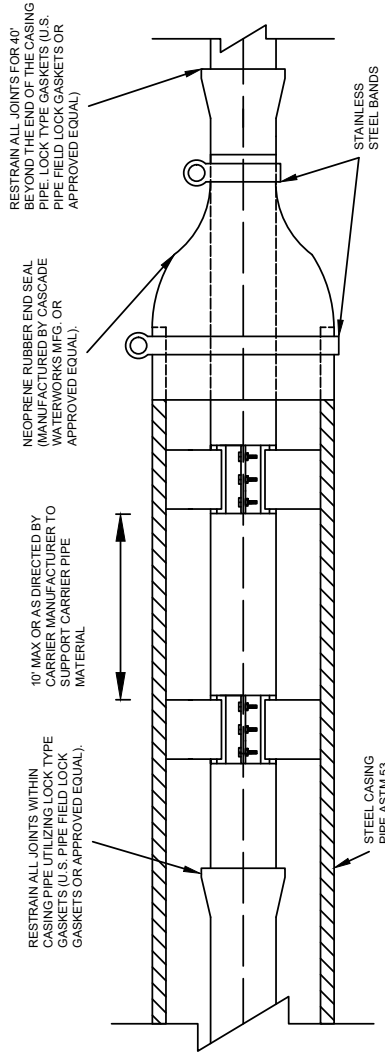
DATE: 10/01/23

DESIGNED BY: RJR

DRAWN BY: WAC

SHEET: D 2.0

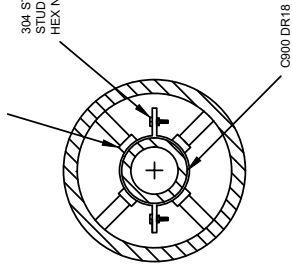




NOTES:

1. ALL BOLTS, NUTS, WASHERS EXPOSED TO DIRECT RAY CONDITIONS SHALL BE LOW ALLOY STEEL. AFTER ASSEMBLY ALL BOLTS, NUTS, AND WASHERS SHALL BE COMPLETELY COATED WITH SPRAY ON CORROSION PROTECTION AND BOLTS SHALL BE EQUIPPED WITH SACRIFICIAL ZINC ANODE CAPS (MANUFACTURED BY TRUMBULL OR APPROVED EQUAL).
2. MATERIALS FURNISHED AND INSTALLED MUST COMPLY WITH WIDNR NR.110.
3. ANY MODIFICATION MUST BE APPROVED BY THE ENGINEER IN ADVANCE.
4. CASING THICKNESS MAY BE INCREASED AS APPLICATIONS AND CONDITIONS WARRANT AND AT THE SOLE DISCRETION OF THE ENGR.
5. MECH BRACKET'S MUST BE ADDED TO EACH JOINT BELL AND SPIGOT.

CASING SPACERS (CASCADE CASING SPACERS MODEL CCS AS MANUFACTURED BY CASCADE WATERWORKS MFG. OR APPROVED EQUAL)



MINIMUM CASING PIPE SIZE (AND CASING THICKNESS)*	20" WATER MAIN - 36" CASING (0.75")
16" WATER MAIN - 30" CASING (0.688")	
12" WATER MAIN - 24" CASING (0.688")	
8" WATER MAIN - 16" CASING (0.50")	
6" WATER MAIN - 12" CASING (0.50")	
4" WATER MAIN - 10" CASING (0.50")	

*BASED ON SCHEDULE 40 WALL THICKNESS WITH 0.5" AS MINIMUM SIZE

(NOT TO SCALE)

STEEL CASING AND DUCTILE
IRON WATER MAIN (BORE)

NOTES:

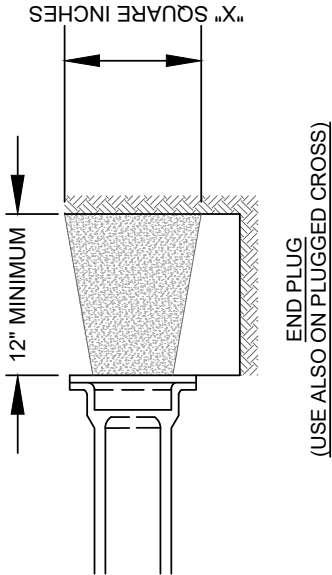
1. BLOCKS DESIGNED FOR 260 P.S.I. PRESSURE, FOR HIGHER PRESSURES CONTACT ENGINEER.
2. VERTICAL BENDS DOWNWARDS (3" AND GREATER) SHOULD BE INDIVIDUALLY DESIGNED USING FLANGED OR RESTRAINED JOINTS.
3. CONCRETE FOR THRUST BLOCKS TO BE 3000 P.S.I. LAID TO UNDISTURBED BEARING WALL OF THE TRENCH IN THE FORM OF A WEDGE WITH THE WIDE END AGAINST THE TRENCH WALL.
4. THRUST BLOCKING IS REQUIRED FOR ALL FORCE MAIN LOCATIONS WHERE THE MAIN CHANGES DIRECTION BY 11.25° OR MORE.
5. A MINIMUM THREE (3") INCH FLOW SAND CUSHION REQUIRED BETWEEN FITTING AND THRUST BLOCK

SIZE OF THRUST BLOCK IN SQUARE INCHES																					
TYPE OF SOIL	1/62 (11.14") & 1/16 (22 1/2") BEND				1/8 (45°) BEND				1/4 (90°) BEND				TEE & END PLUG		IN LINE VALVE						
	1.5"	2"	2.5"	3"	4"	1.5"	2"	2.5"	3"	4"	1.5"	2"	2.5"	3"		4"					
LOOSE SAND & GRAVEL, SOFT CLAY	20	30	40	60	100	40	60	80	110	190	70	100	140	210	340	50	70	100	150	240	COORDINATE WITH ENGINEER
COMPACTED SAND & GRAVEL, DENSE SILT, FIRM TILL & STIFF CLAY	10	20	20	30	50	20	30	40	60	100	40	50	70	110	170	30	40	50	80	120	
VERY STIFF CLAY, DENSE TILL, SHALE OR ROCK	10	10	20	20	40	20	20	30	40	70	30	40	50	70	120	20	30	40	50	80	

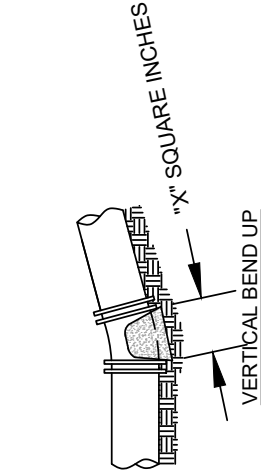
SIZE OF THRUST BLOCK IN SQUARE FEET																					
TYPE OF SOIL	1/62 (11.14") & 1/16 (22 1/2") BEND				1/8 (45°) BEND				1/4 (90°) BEND				TEE & END PLUG		IN LINE VALVE						
	6"	8"	10"	12"	16"	6"	8"	10"	12"	16"	6"	8"	10"	12"		16"					
LOOSE SAND & GRAVEL, SOFT CLAY	2	3	5	7	12	4	6	9	13	23	6	10	16	24	42	4	8	12	17	30	COORDINATE WITH ENGINEER
COMPACTED SAND & GRAVEL, DENSE SILT, FIRM TILL & STIFF CLAY	1	1	2	3	4	1	2	3	5	8	2	4	6	14	2	3	4	6	10		
VERY STIFF CLAY, DENSE TILL, SHALE OR ROCK	1	1	1	2	2	1	1	2	3	4	1	2	3	4	7	1	1	2	3	5	

FORCE MAIN THRUST BLOCKING DETAIL

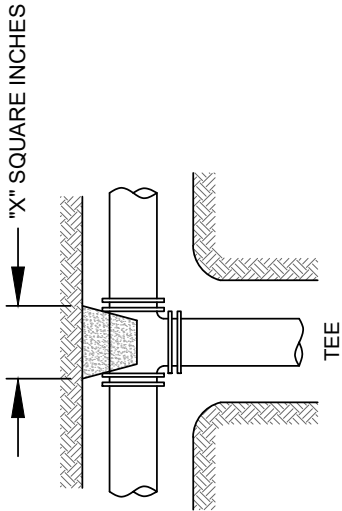
NO SCALE



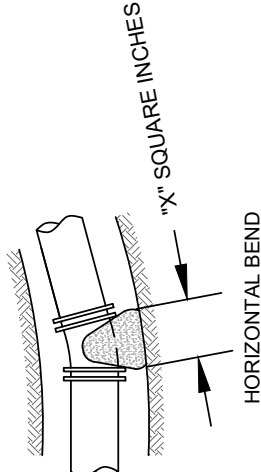
END PLUG
(USE ALSO ON PLUGGED CROSS)



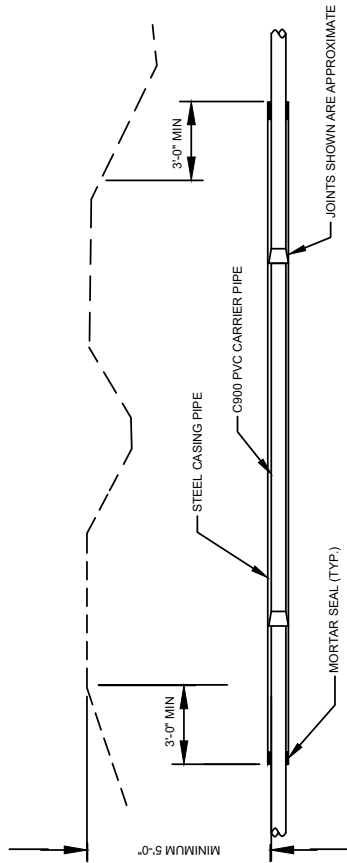
VERTICAL BEND UP



TEE

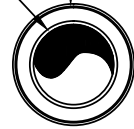


HORIZONTAL BEND



— MORTAR SEAL (TYP.)

JOINTS SHOWN ARE APPROXIMATE



— C900 PVC DR18 CARRIER PIPE

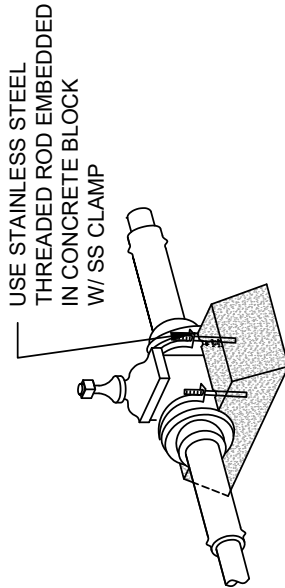
—— STEEL CASING PIPE

CARRIER PIPE NOMINAL DIAMETER (IN)	CASING PIPE NOMINAL DIAMETER (IN)	CASING PIPE THICKNESS (IN)
8	12	0.2500
10	16	0.2500
12	18	0.3130
16	30	0.6880
4	10	0.5000
6	12	0.5000
8	16	0.5000
10	24	0.6880
12	24	0.6880

NOTES:

1. ENDS OF CASING PIPE SHALL BE SEALED WITH CEMENT MORTAR.

BORING DETAILS



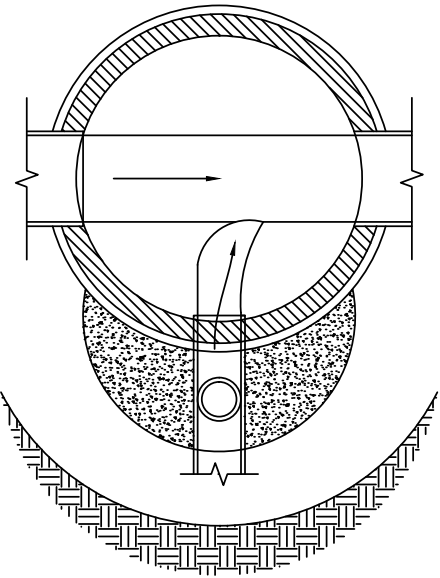
IN LINE VALVE

PROJECT NO:	2023-020 (F)
DATE:	10/01/23
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	D 3.1

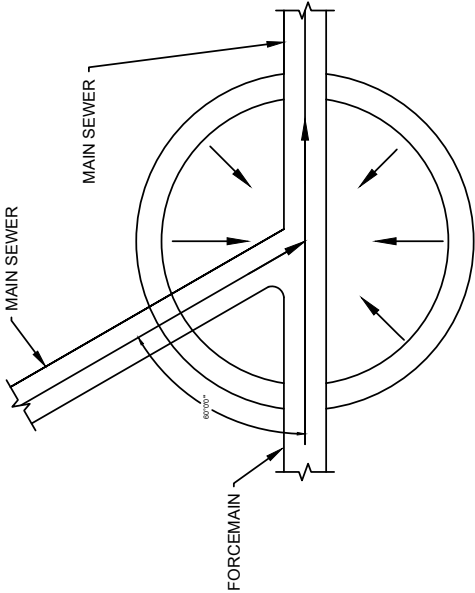


WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation

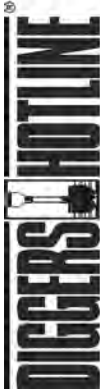
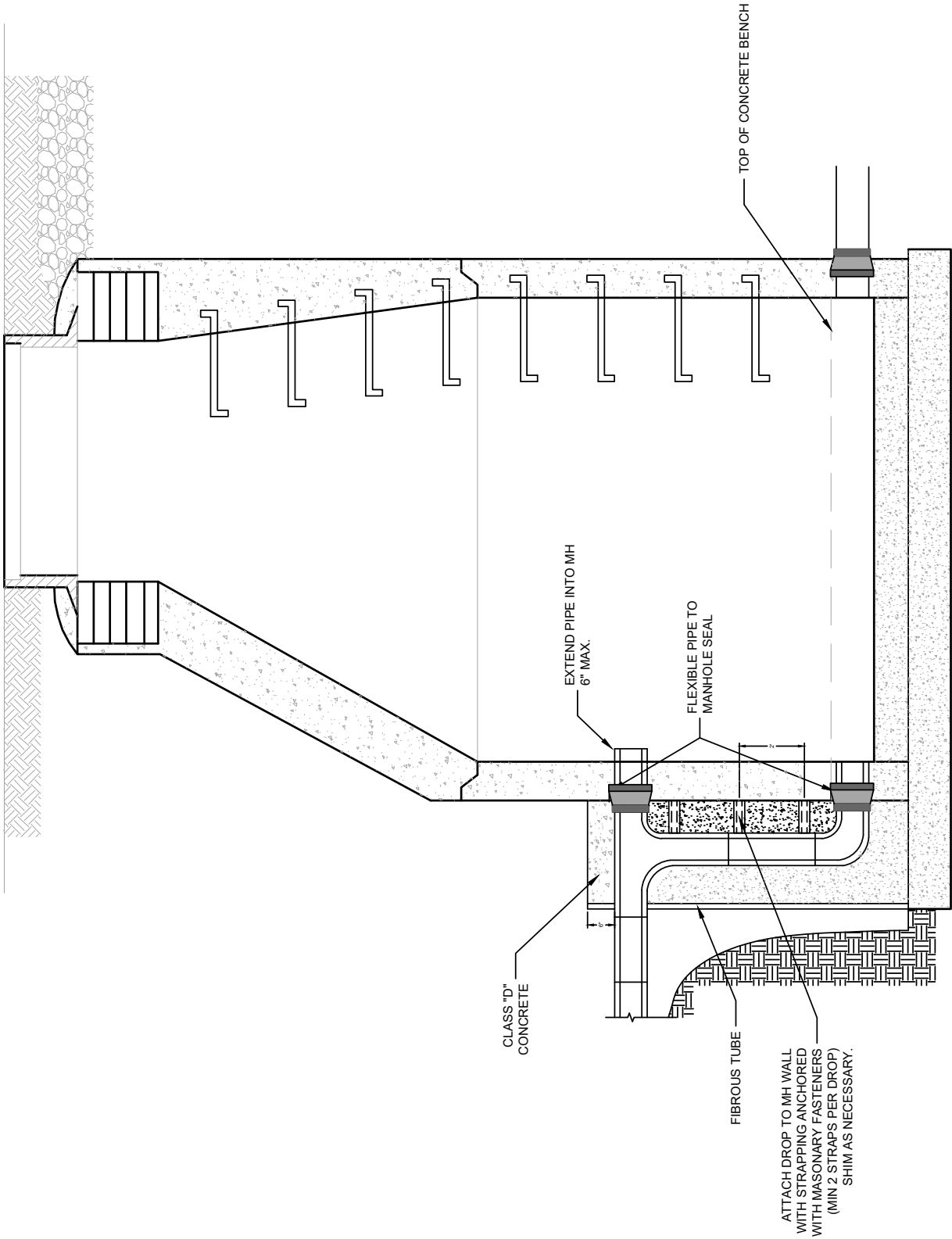
- NOTES:
1. F.L. OF DROP TO BE SET AT SAME ELEVATION AS SPRING LINE OF MAIN.
 2. PIPE DROP TO BE SAME DIA AS INCOMING SEWER INCLUDING 24" DIA (SPECIAL DESIGN FOR GREATER THAN 24" DIA.)



OUTSIDE DROP TO MH



FORCEMAIN TO MH



WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation.

DROP MANHOLE DETAIL

LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/01/25

PROJECT NO: 2023-020 (F)

DATE: 10/01/23

DESIGNED BY: RJR

DRAWN BY: WAC

SHEET: D 3.2



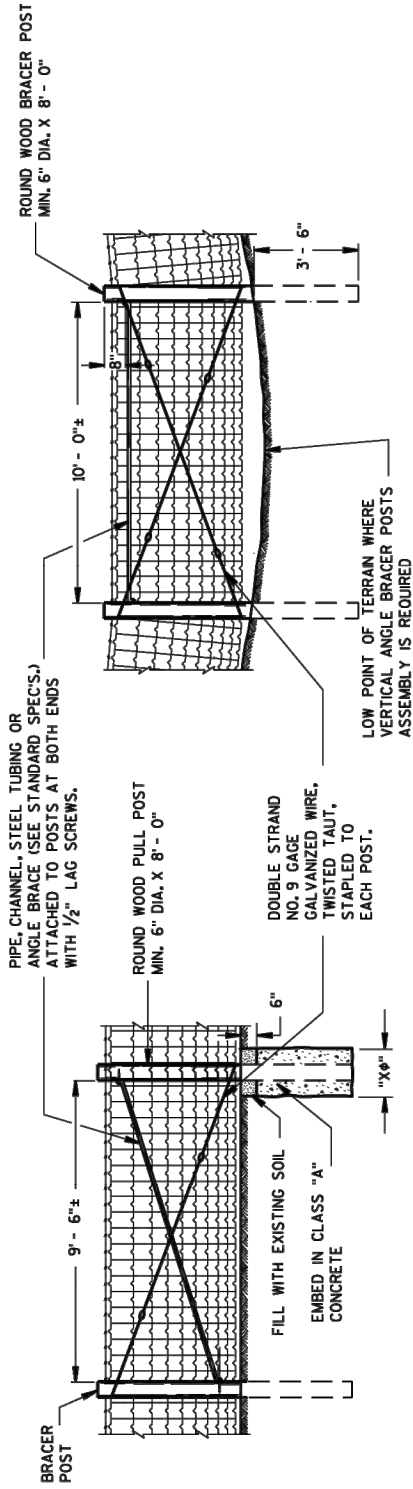
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SDD 15B1-a Fence Woven Wire

NOTE: PULL OR STRETCHER POST ASSEMBLIES SHALL BE PLACED MIDWAY BETWEEN END POSTS AND CORNER POSTS WHERE A RUN OF FENCE EXCEEDS 660' BUT IS LESS THAN 1,320'. FOR RUNS OF FENCE IN EXCESS OF 1,320' MAXIMUM SPACING OF PULL OR STRETCHER POST ASSEMBLIES SHALL BE 660'± C-C.

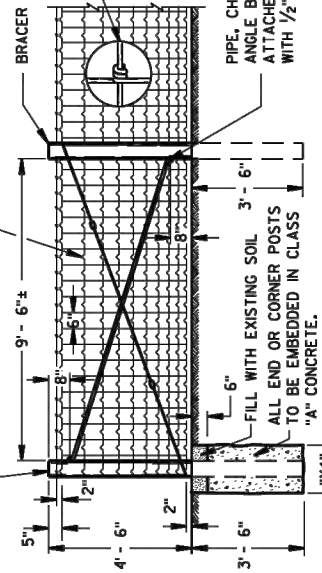
ILLUSTRATION SHOWS POSITION OF STANDARD STEEL BRACE, DOUBLE STRAND GALVANIZED WIRE, AND THE POST TO BE EMBEDDED IN CONCRETE WHEN WIRE FENCE IS INSTALLED FROM LEFT TO RIGHT. THE BRACES SHALL BE POSITIONED ON THE OPPOSITE DIAGONALS AND THE OPPOSITE POST SHALL BE EMBEDDED IN CONCRETE WHEN WIRE FENCE IS INSTALLED FROM RIGHT TO LEFT.



PULL OR STRETCHER POSTS ASSEMBLY

STANDARD WOVEN WIRE FENCE- TOP AND BOTTOM HORIZONTAL WIRES NO. 9 GA. ALL OTHER HORIZONTAL WIRES AND ALL VERTICAL WIRES NO. 11 GA.

ROUND WOOD END, CORNER, BRACER OR VERTICAL ANGLE POSTS MIN. 6" DIA. X 8' - 0"



NOTE: FENCE CORNERS - ABOVE ILLUSTRATION SHOWS ONE LEG OF FENCE CONSTRUCTION AT FENCE CORNER. THE CONTIGUOUS LEG TO BE IDENTICAL CONSTRUCTION.

END OR CORNER POSTS ASSEMBLY

VERTICAL ANGLE BRACER POSTS ASSEMBLY

NO. 11 GA. GALVANIZED STEEL WIRE CONNECTOR OR NO. 10 GA. COPPER WIRE CONNECTOR, ONE REQUIRED AT EACH GROUND ROD LOCATION. 15 1/2 GAGE MINIMUM, TWO STRAND BARBED WIRE. THE STRAND BREAKING STRENGTH SHALL BE AT LEAST 950 POUNDS. ZINC COATING SHALL NOT BE LESS THAN 0.80 OUNCE PER SQUARE FOOT OF UNCOATED SURFACE.

ROUND WOOD LINE POSTS MIN. 4 1/2" DIA. X 7' - 0" - 16' - 0" C-C.

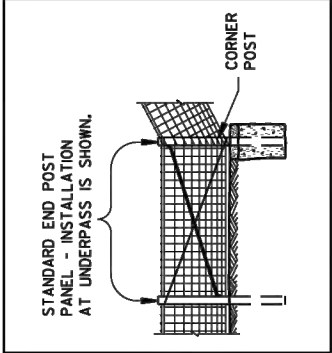
ALTERNATE METHODS OF SECURING VERTICAL STAY WIRES TO HORIZONTAL WIRES - SECURELY WELDED OR TWISTED.

PIPE, CHANNEL, STEEL TUBING OR ANGLE BRACE (SEE STANDARD SPEC-S) ATTACHED TO POSTS AT BOTH ENDS WITH 1/2" LAG SCREWS.

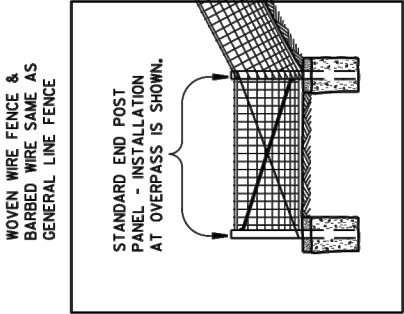
GROUND ROD & SPACING SHALL CONFORM TO STANDARD SPECIFICATIONS 616.3.3

LINE FENCE CONSTRUCTION

GENERAL ROADSIDE VIEW OF WOVEN WIRE FENCE



ALTERNATE FENCE DESIGN AT STRUCTURE



NOTE: STRUCTURE APPROACH SECTION- ALL ROUND WOOD POSTS 6" MIN. DIA. X 8' - 0"

FENCE DESIGN AT STRUCTURE APPROACH

GENERAL NOTES

"X#" = DIAMETER OF THE POST PLUS 12".

FENCE STAPLES SHOULD NEVER BE DRIVEN VERTICALLY INTO WOOD POSTS (WITH BOTH LEGS PARALLEL WITH THE WOOD GRAIN). DOING SO CAN SEPARATE THE GRAIN AND SIGNIFICANTLY REDUCE THE HOLDING POWER. ROTATING THE STAPLES SLIGHTLY OFF VERTICAL STRADDLES THE GRAIN AND PROVIDES MORE RESISTANCE TO PULL-OUT.

DO NOT STAPLE WIRE TIGHT TO THE LINE POSTS. ALLOW MOVEMENT OF WIRE FOR EXPANSION AND CONTRACTION. STAPLE ARRANGEMENT SHALL BE THE SAME FOR ALL OTHER POSTS EXCEPT THAT THEY SHALL BE DRIVEN TIGHT TO POSTS. ALL STAPLES SHALL BE 2" X 9 GAGE AND SHALL BE MANUFACTURED FROM GALVANIZED WIRE OR HOT DIP GALVANIZED AFTER FORMING. STAPLES SHALL HAVE SLASH-CUT POINTS.

FENCE SHALL BE LOCATED 3'-0" INSIDE THE RIGHT OF WAY LINE UNLESS OTHERWISE INDICATED ON THE PLANS.

SDD WISDOT FENCE DETAILS

LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/01/25

PROJECT NO: 2023-020 (F)

DATE: 10/01/23

DESIGNED BY: RJR

DRAWN BY: WAC

SHEET: D 4.0

S.D.D. 15 B 1-8a

FENCE WOVEN WIRE

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

6

6

S.D.D. 15 B 1-8a

ROADSIDE ELEVATION (LOOKING TOWARDS ROADWAY)

PLAN VIEW

Diagram illustrating a wire mesh fence system. The fence is supported by a line post. The ground line is shown below the fence. An extra long post is indicated where necessary, with a dimension of 16' - 0" shown for the distance between posts.

PLAN VIEW

FENCE LOCATION AT STRUCTURES

Diagram illustrating a road layout with a 3'-0" offset from a line post, a 4'-0" offset from a right-of-way line, and a 2° to 40° angle of change.

PLAN VIEW

NOTE: SINGLE AND DOUBLE POSTS SHALL BE A MIN. 6" DIA. X 8'-0" WITH A LEAN OF 4" TOWARD THE OUTSIDE OF THE CURVE.

WHEN THE RIGHT OF WAY LINE CHANGE IS MORE THAN 40° USE THE CORNER OR STRETCHER POSTS ASSEMBLY.

Diagram illustrating the corner post assembly. The diagram shows a cross-section of a road corner with a corner post assembly. Labels include: "TOP OF SLOPE", "CORNER POST ASSEMBLY", and "4" MIN." indicating a minimum clearance.

ROTATE AWAY FROM FLAT FACE.

LINE POST

STAPLES SLOPED DOWNWARD FOR SUSTAINED GRADES AND OVER KNOLLS.

STAPLES SLOPE UPWARDS WHEN FENCE TENDS TO LIFT.

FENCE WOVEN WIRE STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION	APPROVED 4/14/2008 DATE FHW	/S/ JERRY H. ZOGG ROADWAY STAFF DEVELOPMENT ENGINEER

S.D.D. 15 B 1-81

SDD WISDOT FENCE DETAILS

TAX INCREMENTAL FINANCE DISTRICT #2

BID SET 2/01/25

PROJECT NO:	2023-020 (F)
DATE:	10/01/23
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	D 4 1



NOTE:

1. CONFIRM CIRCUIT AMPERAGE & CONDUCTORS W/SUPPLIER PACKAGE.
2. THIS ONE-LINE IS INTENDED TO DEPICT GENERAL POWER FLOW POWER & CONTROL COMPONENTS INTO A PRE-FAB PUMP CONTROL PANEL.
3. FIELD ELECTRICIAN IS RESPONSIBLE FOR ELECTRIC SERVICE ENTRANCE INCLUDING METER SOCKET, MAIN DISCONNECT, & MAIN ATS WIRING.
4. CONFIRM VFD SIZING FOR MOTOR STARTERS.
5. PROVIDE SILICONE SEAL-OFFS AROUND EXISTING OR NEW WIRES FROM WETWELL TO PANEL(S).
6. ELECTRICIAN WITH GENERAL CONTRACTOR TO VERIFY CONNECTION OF SYSTEMS TO GENERATOR, INCLUDING GAS PER WPS.
7. ALL SCADA & COMMUNICATION SUB PANELS TO BE NEMA 12
8. SEE SHEET B 3.1 FOR LAYOUT & LOCATION. 

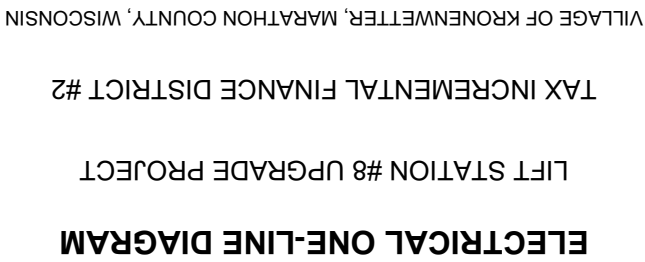
LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

BID SET 2/04/25

ADDENDUM 1

PROJECT NO:	2023-020 (F)
DATE:	01/05/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	E 1.0



PROJECT NO:	2023-020 (F)
DATE:	01/05/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	E 1.0

NOTE:

1. CONFIRM CIRCUIT AMPERAGE & CONDUCTORS W/SUPPLIER PACKAGE
2. THIS ONE-LINE IS INTENDED TO DEPICT GENERAL POWER FLOW POWER & CONTROL COMPONENTS INTO A PRE-FAB PUMP CONTROL PANEL.
3. FIELD ELECTRICIAN IS RESPONSIBLE FOR ELECTRIC SERVICE ENTRANCE INCLUDING METER SOCKET, MAIN DISCONNECT, & MAIN ATS WIRING.
4. CONFIRM VFD SIZING FOR MOTOR STARTERS.
5. PROVIDE SILICONE SEAL-OFFS AROUND EXISTING OR NEW WIRES FROM WETWELL TO PANEL(S).
6. ELECTRICIAN WITH GENERAL CONTRACTOR TO VERIFY CONNECTION SYSTEMS TO GENERATOR, INCLUDING GAS PER WPS.
7. ALL SCADA & COMMUNICATION SUB PANELS TO BE NEMA 12
8. SEE SHEET B 3.1 FOR LAYOUT & LOCATION.



CONTROL CABINET INSIDE FIBERGLASS

Diagram showing the internal wiring of the control cabinet, including circuit breakers (CB2, CB3, CB4) and differential switches (DS2, DS3). The components are connected to a common power source and various loads, including a heater thermostat control (1), a heater w/ thermostat control (H2), backup floats, and a level transducer.

Labels for components:

- CB2 | 20A | 3PH
- CB3 | 20A | 3PH
- CB4 | 15A | 3PH
- DS2
- DS3
- 1 | HEATER THERMOSTAT CONTROL
- H2 | GEN HEATER W/ THERMOSTAT CONTROL
- BACKUP FLOATS
- LEVEL TRANSDUCER

CONFIRMARE IL CORRETTO FUNZIONAMENTO DEL TERMOSTATO PER IL RISCALDAMENTO.

-
- 15KV/
- CB2 20A 3PH
- CB3 20A 3PH
- CB4 15A 3PH
- CB5 15A 3PH
- CB6 30A 3PH
- CB7 15A 1PH
- CB8 15A 1PH
- DS2
- DS3
- H1 EL HEATER THERMOSTAT CONTROL
- H2 GEN HEATER W/ THERMOSTAT CONTROL
- BACKUP FLOUTS
- LEVEL TRANSDUCER
- SPARE
- PANEL OUTLET
- PANEL LIGHT
- 15KV/
- CONTROL CABINET INSIDE FIBERGLASS ENCLOSURE LIFT STATION #8
- ONE-LINE LIFTSTATION #8**
- NOTE:

[illegible]

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LIFT STATION #8 UPGRADE PROJECT	TAX INCREMENTAL FINANCE DISTRICT #2	
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ELECTRICAL ONE-LINE DIAGRAM

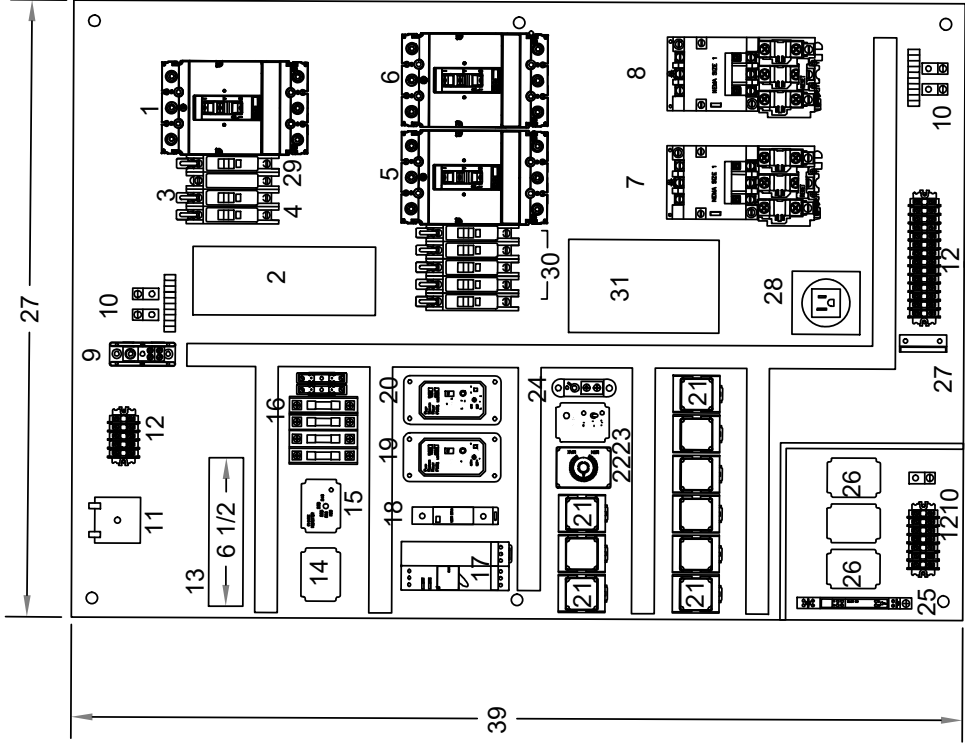
LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/04/25

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LAYOUT MAY VARY

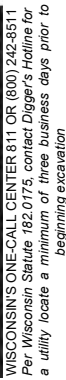
- 1 - MCB MAIN CIRCUIT BREAKER
- 2 - SPD1 SURGE ARRESTOR
- 3 - CCB CONTROL BREAKER
- 4 - DRB RECEPTACLE BREAKER
- 5 - MB1 MOTOR BREAKER 1
- 6 - MB2 MOTOR BREAKER 2
- 7 - MS1 MOTOR STARTER 1
- 8 - MS2 MOTOR STARTER 2
- 9 - N NEUTRAL
- 10 - G GROUND
- 11 - FL FLASHER
- 12 - TS TERMINAL STRIP
- 13 - RADIO
- 14 - PS1 POWER SUPPLY 1
- 15 - PM PHASE MONITOR
- 16 - FUSE HOLDERS
- 17 - PS2 POWER SUPPLY 2
- 18 - SPD2 SURGE ARRESTOR
- 19 - PMR1-1 PUMP MONITOR RELAY 1
- 20 - PMR1-2 PUMP MONITOR RELAY 2
- 21 - R RELAYS
- 22 - TD TIME DELAY
- 23 - ALT AUTO ALTERNATOR
- 24 - TH THERMOSTAT
- 25 - ISB INTRINSICALLY SAFE BARRIER
- 26 - ISR INTRINSICALLY SAFE RELAYS
- 27 - HT HEATER
- 28 - RECEPTACLE FOR UPS
- 29 - LPM LIGHT PANEL BREAKER
- 30 - 120 V CB1-5 CIRCUIT BREAKERS
- 31 - STEP DOWN TRANSFORMER

Diagram of a UPS unit with the labels "UPS" and "20".

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

SHEET: E11





The diagram illustrates the installation of a level switch. A rectangular box represents the NEMA 4 terminal junction box. A conduit and wire run from the box to a circular level switch. The switch is mounted on a horizontal pipe. A cable clamp is used to secure the switch to the pipe. The diagram includes several dimension lines and labels: 'TO JUNCTION BOX, PROVIDE MIN OF 1'-0" SLACK IN CABLE TO ALLOW FOR ADJUSTMENT OF SWITCH ACTUATION LEVEL' points to the cable slack; 'WITH 2-3/8" x 5" SST BOLTS AND SST CONCRETE ANCHORS, TYP.' points to the mounting hardware; '1' MIN.' indicates the minimum distance from the switch to the pipe; 'ACTUATION LEVEL AS NOTED OR SHOWN' points to the level switch; and 'CABLE CLAMP**' points to the clamp on the pipe.

NEMA 4 TERMINAL JUNCTION BOX
AS REQUIRED *

CONDUIT & WIRE TO RECEIVER *

TO JUNCTION BOX, PROVIDE MIN OF 1'-0"
SLACK IN CABLE TO ALLOW FOR ADJUSTMENT
OF SWITCH ACTUATION LEVEL

WITH 2-3/8" x 5" SST BOLTS AND SST CONCRETE ANCHORS, TYP.

LEVEL SWITCH

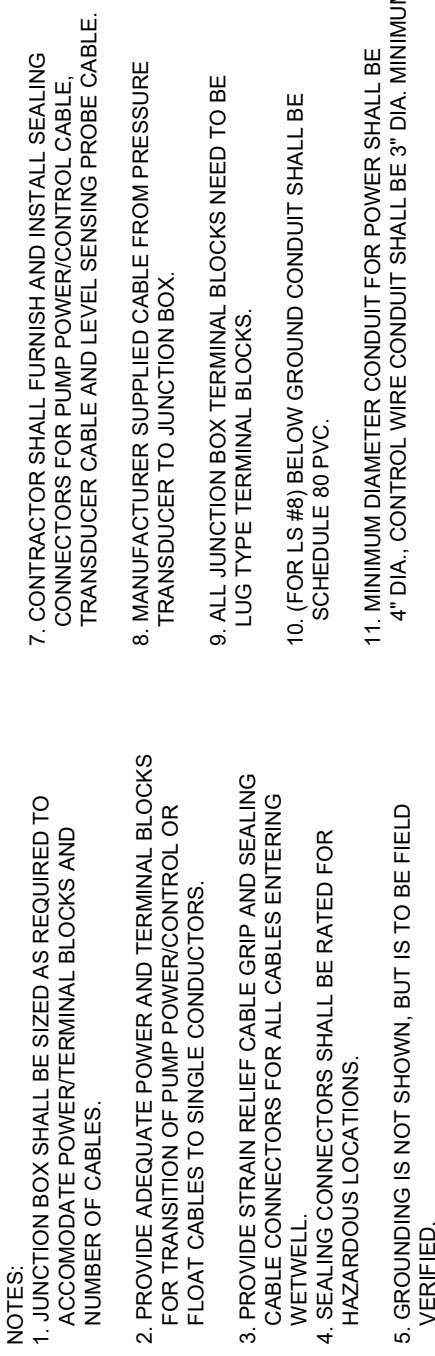
1' MIN.

ACTUATION LEVEL AS NOTED OR SHOWN

1' MIN.

CABLE CLAMP**

- * INSTALLATION TO BE INTRINSICALLY SAFE



PUMP/FLOAT CABLE WETWELL JUNCTION BOX SCHEMATIC DETAIL

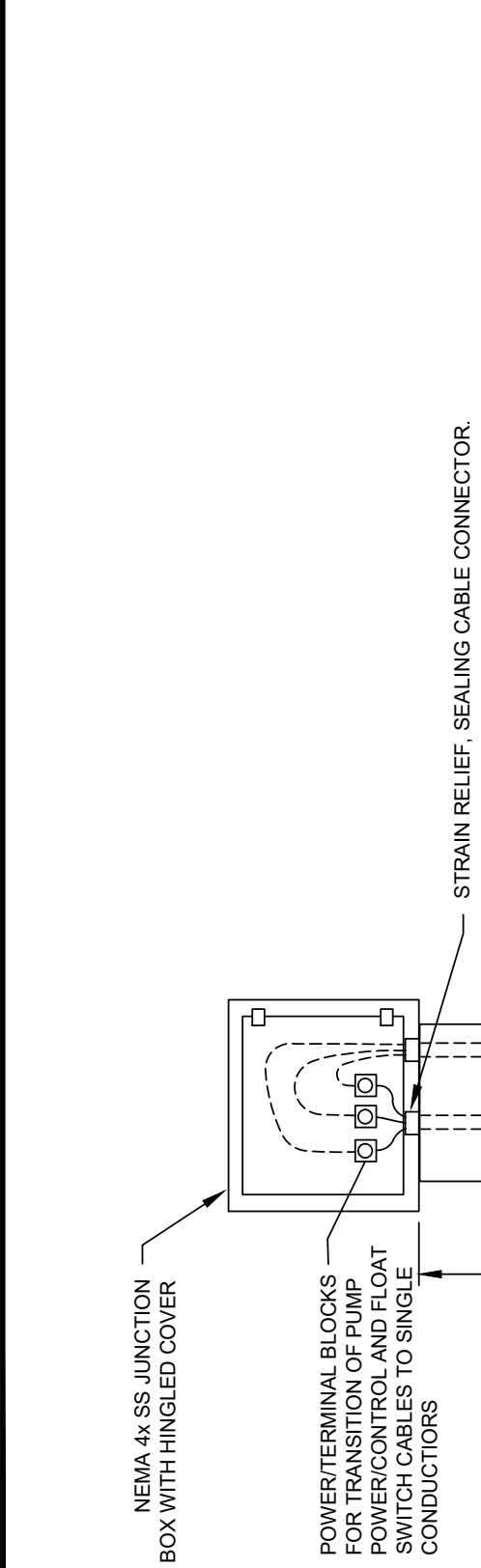
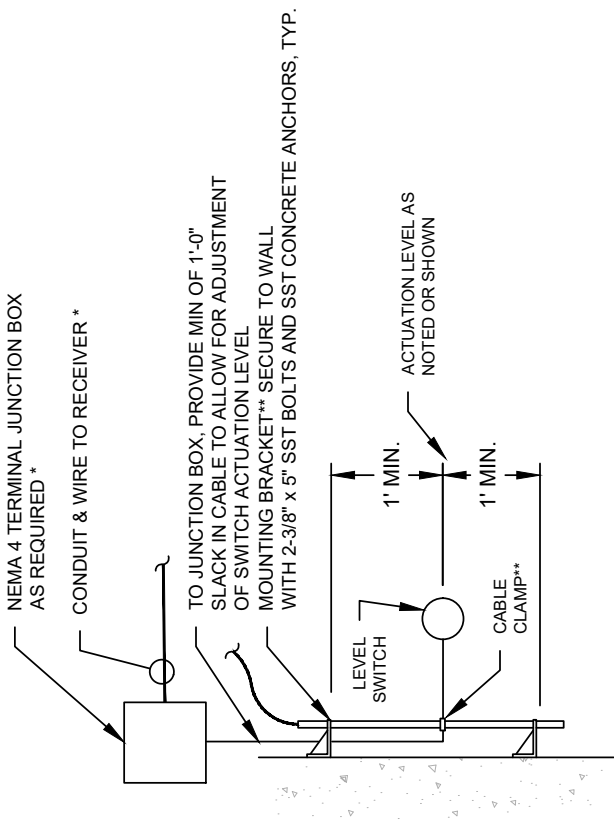
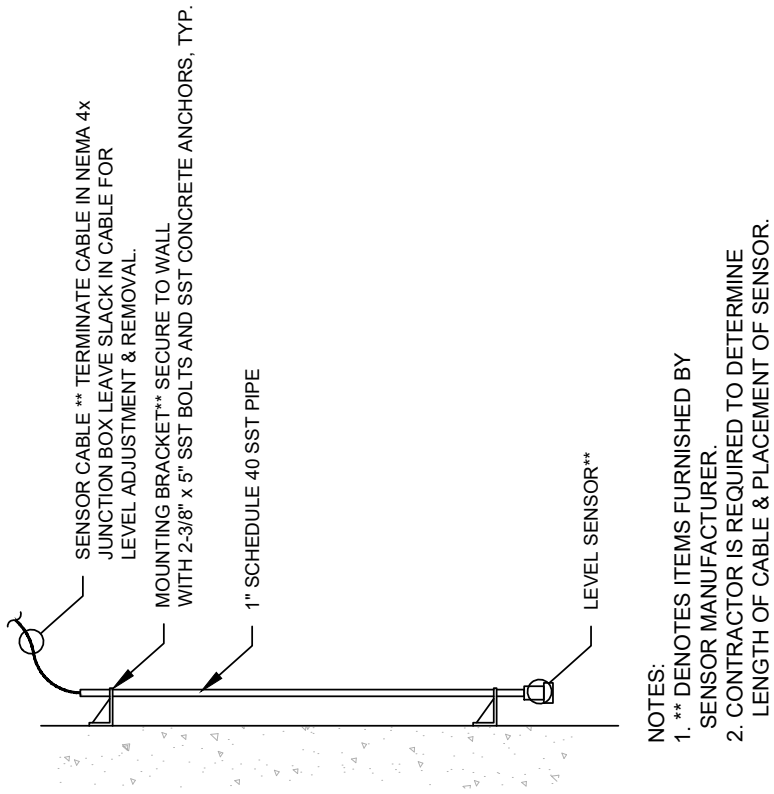


Diagram illustrating the connection of a cable to a device, showing the strain relief and sealing cable connector components.



SENSOR CABLE ** TERMINAL JUNCTION BOX LEAVE SLACK FOR LEVEL ADJUSTMENT & REMOUNTING **

MOUNTING BRACKET** SECURE WITH 2-3/8" x 5" SST BOLTS AND NUTS

1" SCHEDULE 40 SST PIPE

LEVEL SENSOR**

NOTES:

- ** DENOTES ITEMS FURNISHED BY SENSOR MANUFACTURER.
- CONTRACTOR IS REQUIRED TO DETERMINE THE LENGTH OF CABLE & PLACEMENT OF SENSING POINTS.

LEVEL SENSOR INSTALLATION

NEMA 4 TERMINAL JUNCTION BOX AS REQUIRED *

CONDUIT & WIRE TO RECEIVER *

TO JUNCTION BOX, PROVIDE MINIMUM SLACK IN CABLE TO ALLOW FOR ADJUSTMENT OF SWITCH ACTUATION LEVEL

MOUNTING BRACKET** SECURE TO STRUCTURE WITH 2-3/8" x 5" SST BOLTS AND NUTS

LEVEL SWITCH

1' MIN.

1' MIN.

CABLE CLAMP**

ACTUATION POINT NOTED OR MARKED

NOTES:

- ** DENOTES ITEMS FURNISHED BY SENSOR MANUFACTURER.
- THIS IS A STANDARD DETAIL. THEREFORE, NO CHANGES OR MODIFICATIONS TO THIS INSTALLATION MAY NOT BE USED.

* INSTALLATION TO BE INTRINSICALLY SAFE.

SENSOR CABLE ** TERMINATE CABLE IN NEMA JUNCTION BOX LEAVE SLACK IN CABLE FOR LEVEL ADJUSTMENT & REMOVAL.

MOUNTING BRACKET** SECURE TO WALL WITH 2-3/8" x 5" SST BOLTS AND SST CONCRETE ANCHORS.

1" SCHEDULE 40 SST PIPE

LEVEL SENSOR**

NOTES:

1. ** DENOTES ITEMS FURNISHED BY SENSOR MANUFACTURER.
2. CONTRACTOR IS REQUIRED TO DETERMINE LENGTH OF CABLE & PLACEMENT OF SENSOR.

LEVEL SENSOR INSTALLATION

NEMA 4 TERMINAL JUNCTION BOX AS REQUIRED *

CONDUIT & WIRE TO RECEIVER *

TO JUNCTION BOX, PROVIDE MIN OF 1'-0" SLACK IN CABLE TO ALLOW FOR ADJUSTMENT OF SWITCH ACTUATION LEVEL

MOUNTING BRACKET** SECURE TO WALL WITH 2-3/8" x 5" SST BOLTS AND SST CONCRETE ANCHORS.

LEVEL SWITCH

1' MIN.

ACTUATION LEVEL AS NOTED OR SHOWN

1' MIN.

CABLE CLAMP**

NOTES:

1. ** DENOTES ITEMS FURNISHED BY SENSOR MANUFACTURER.
2. THIS IS A STANDARD DETAIL. THEREFORE BOTH INSTALLATIONS MAY NOT BE USED.

* INSTALLATION TO BE INTRINSICALLY SAFE.

FLOAT TYPE LEVEL SWITCH INSTALLATION

ELECTRICAL DETAILS	
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LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

LIFT STATION #8 UPGRADE PROJECT

TAX INCREMENTAL FINANCE DISTRICT #2

RPS
ROTH
PROFESSIONAL
SOLUTIONS

	ELECTRICAL DETAILS LIFT STATION #8 UPGRADE PROJECT TAX INCREMENTAL FINANCE DISTRICT #2	BID SET 2/04/25
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ELECTRICAL DETAILS	LIFT STATION #8 UPGRADE PROJECT	TAX INCREMENTAL FINANCE DISTRICT #2	VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN
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	ELECTRICAL DETAILS	LIFT STATION #8 UPGRADE PROJECT	TAX INCREMENTAL FINANCE DISTRICT #2	VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN
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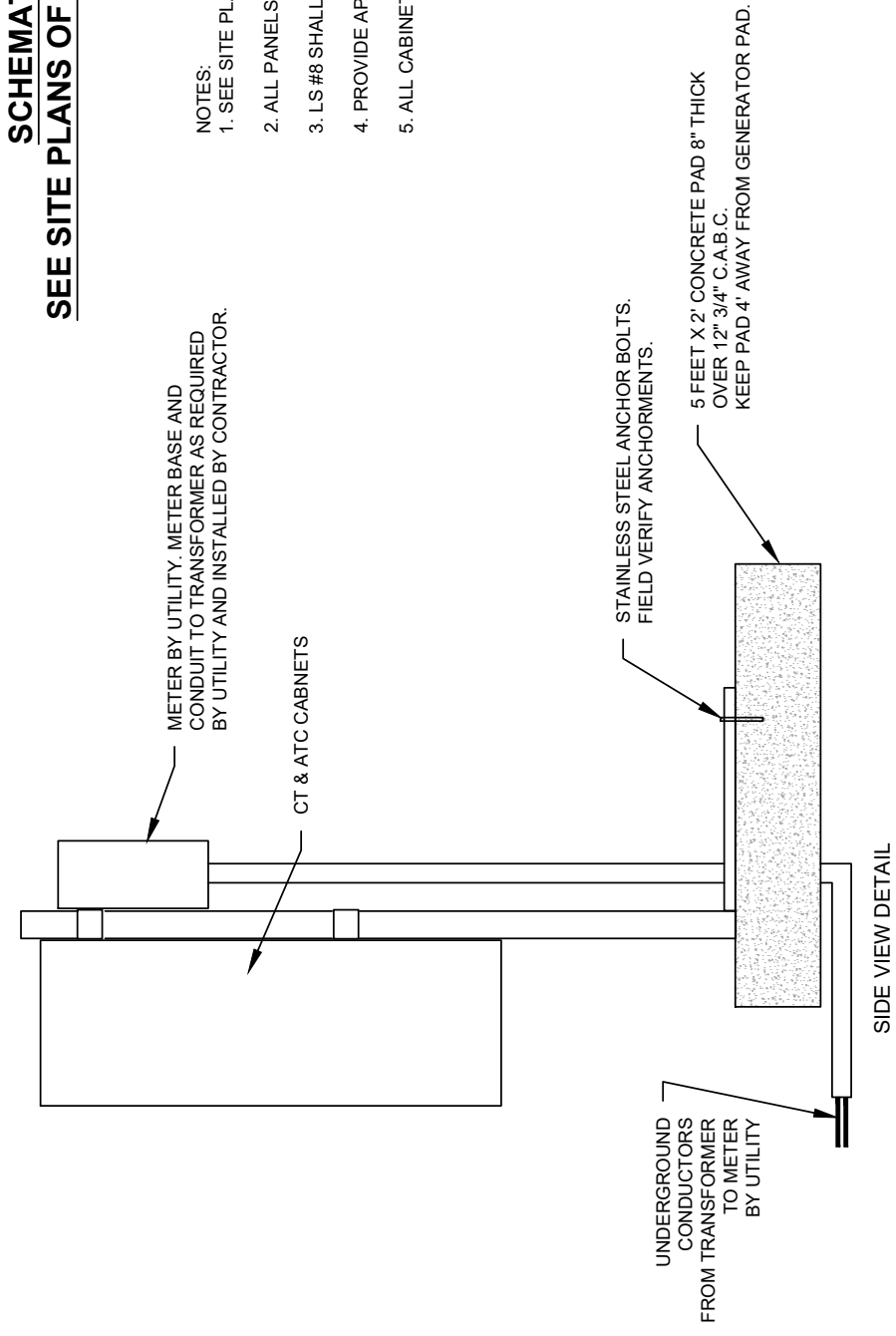
ELECTRICAL DETAILS LIFT STATION #8 UPGRADE PROJECT TAX INCREMENTAL FINANCE DISTRICT #2 VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN		BID SET 2/04/25	
		PROJECT NO: 2023-020 (F) DATE: 01/05/24 DESIGNED BY: RJR DRAWN BY: WAC	

ELECTRICAL DETAILS

LIFT STATION #8 UPGRADE PROJECT
TAX INCREMENTAL FINANCE DISTRICT #2



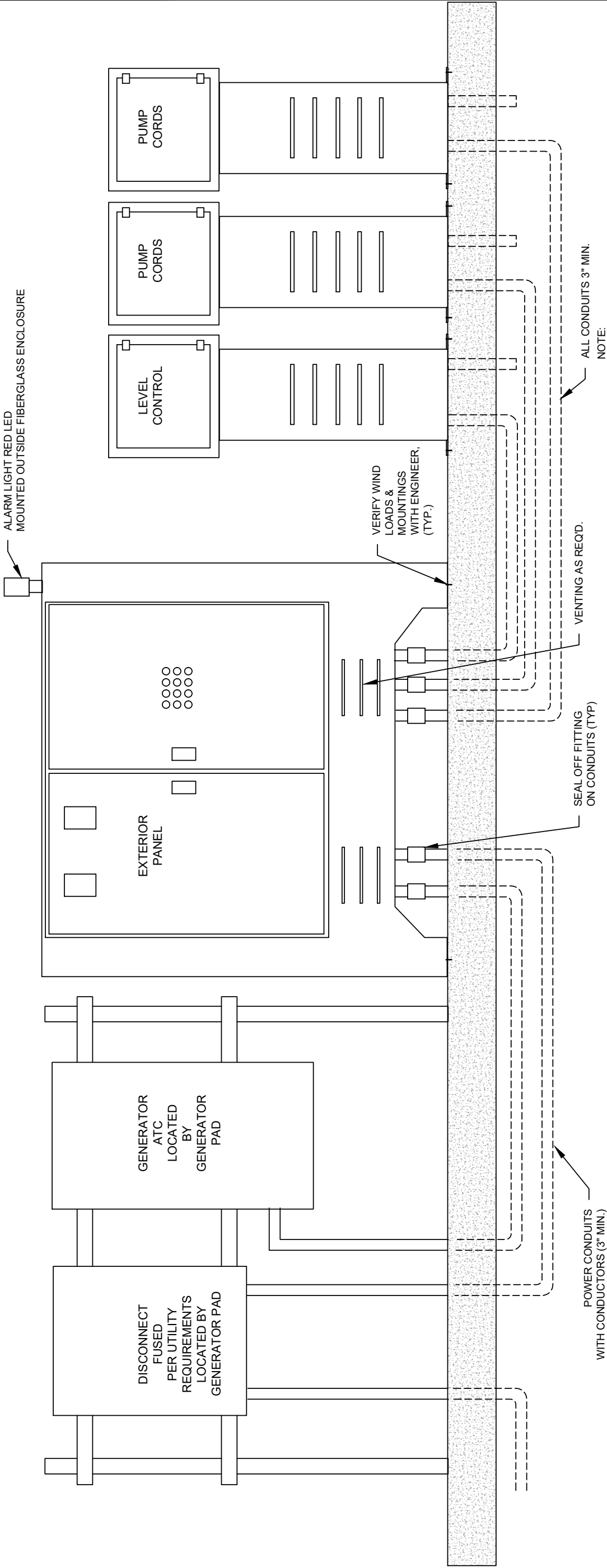
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ELECTRICAL DETAILS

ADDENDUM 1
BID SET 2/04/25

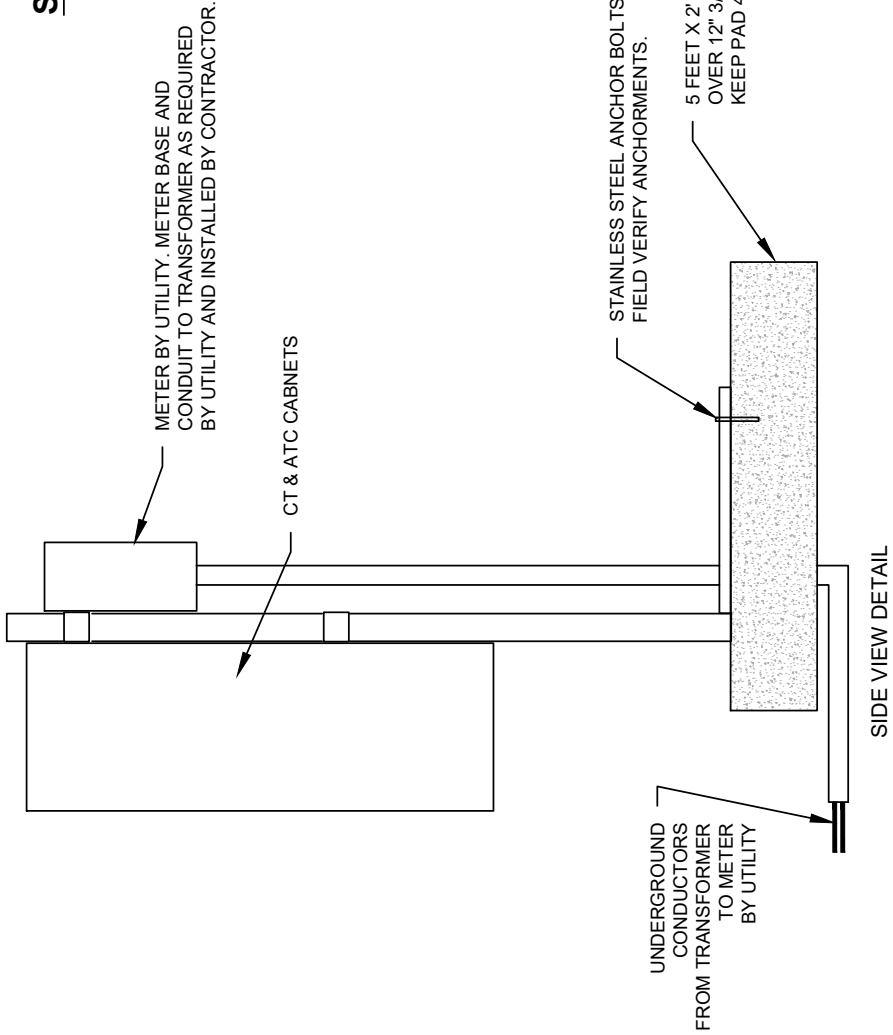
PROJECT NO:	2023-020 (F)
DATE:	01/05/24
DESIGNED BY:	RJR
DRAWN BY:	WAC
SHEET:	E 1.3

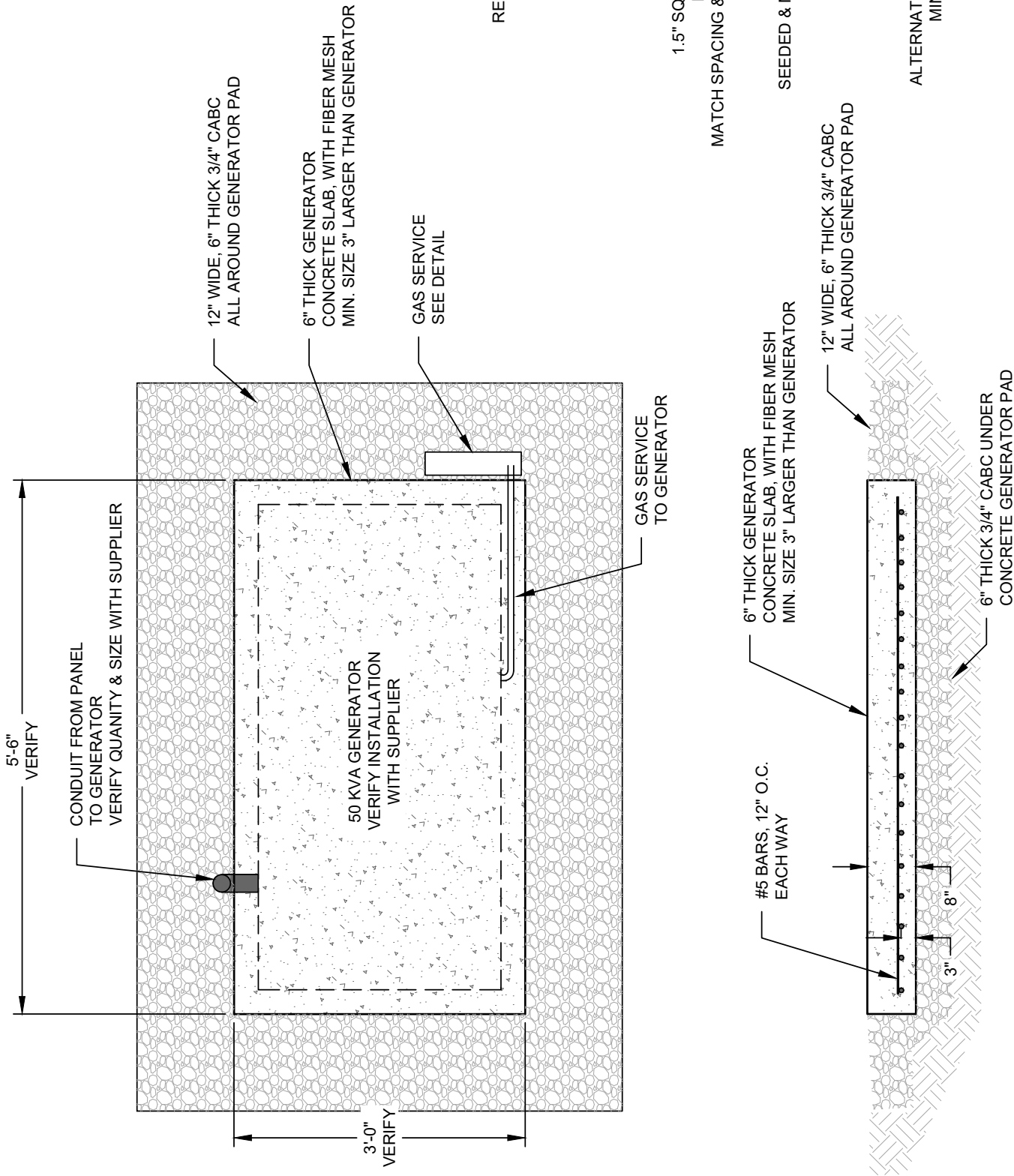


SEE SITE PLANS OF LIFT STATIONS FOR EXACT LAYOUT

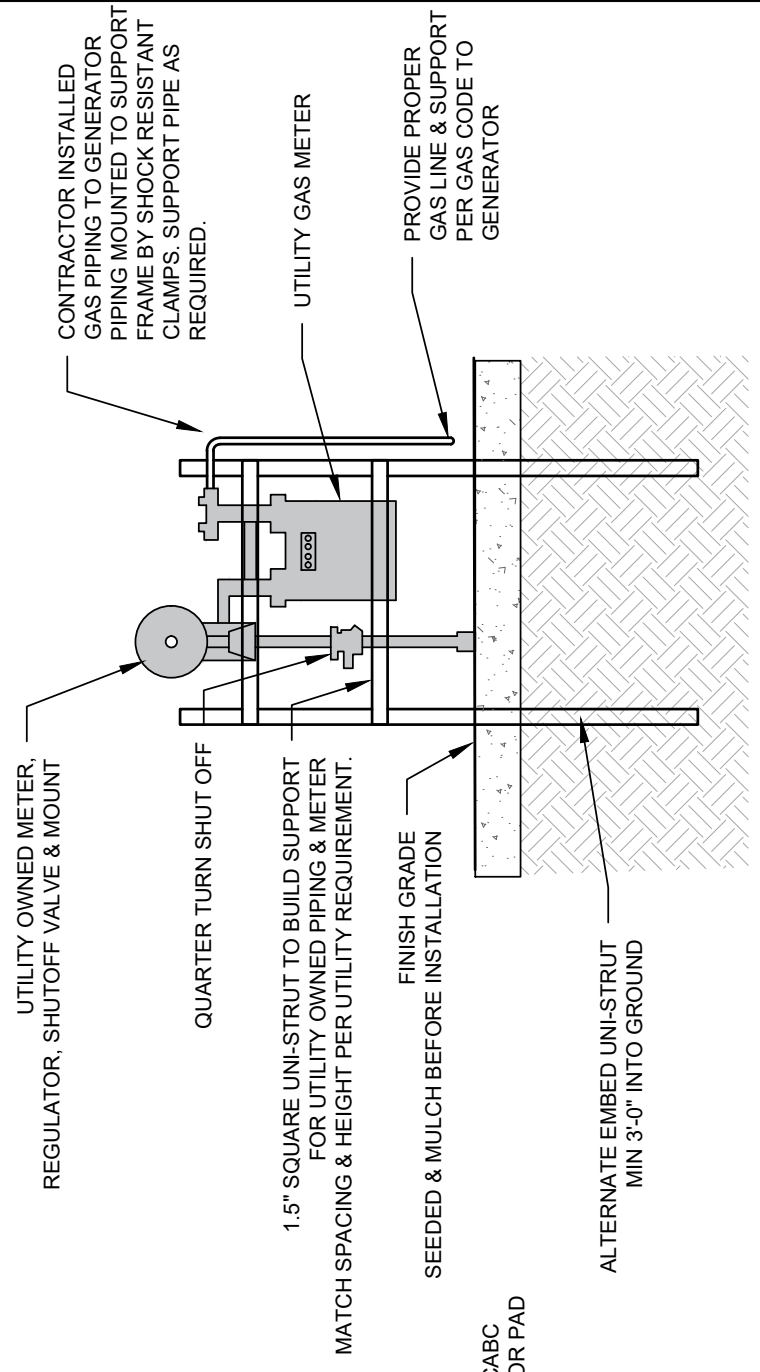
SCHEMATIC LAYOUT FOR PANELS

- NOTES:
1. SEE SITE PLAN FOR EXACT LOCATION OF CONTROL PANEL EQUIPMENT.
 2. ALL PANELS SHALL BE NEMA 4X SS.
 3. LS #8 SHALL BE 3 PHASE, 277/480 V.
 4. PROVIDE APPROPRIATE BRACING SO THAT EQUIPMENT STAND IS STURDY ONCE ALL EQUIPMENT IS ATTACHED.
 5. ALL CABINET PENETRATIONS SHALL BE FROM BOTTOM.



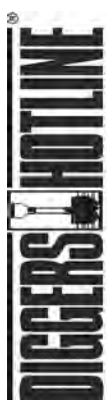


NOTE:
CONTRACTOR SHALL INSTALL SUPPORT AS CLOSE TO GENERATOR PAD AS POSSIBLE
FOLLOW UTILITY REQUIREMENTS FOR HEIGHT AND SIZE OF FRAME TO SUPPORT METER.



GENERATOR CONCRETE SLAB

GAS SERVICE @ GENERATOR SITE



WISCONSIN'S ONE-CALL CENTER 811 OR (800) 242-8511
Per Wisconsin Statute 182.0175, contact Digger's Hotline for a utility locate a minimum of three business days prior to beginning excavation.



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GAS SERVICE DETAIL

LIFT STATION #8 UPGRADE

TAX INCREMENTAL FINANCE DISTRICT #2

VILLAGE OF KRONENWETTER, MARATHON COUNTY, WISCONSIN

BID SET 2/01/25
PROJECT NO: 2023-020 (F)
DATE: 10/01/23
DESIGNED BY: RJR
DRAWN BY: WAC
SHEET: F 1.0

**VILLAGE OF KRONENWETTER – LIFT STATION 8
ADDENDUM #1**

Date: February 26, 2025

Project: Village of Kronenwetter Lift Station 8

QuestCDN Number: #9514919

Bids Close Date: **MARCH 4, 2025 @ 11:00 AM LOCAL TIME
(NO CHANGE)
KRONENWETTER MUNICIPAL BUILDING**

This Addendum is issued to modify, explain, or correct the original Project Documents, and is hereby made part of the Project Documents. Please attach this Addendum to the Project Documents and/or distribute accordingly.

CHANGES TO SPECIFICATIONS:

00 4100 – BID FORM AND PROPOSAL

- Item #22 Changed Quantity to 20 gallons
- Item #A4 Changed Quantity to 300 SY
- Item #A7 Changed Quantity to 330 SY
- Item #A8 Changed Bid Item to 3” Breaker Run and Quantity to 300 SY
- Item #A9 Changed Quantity to 72 TN
- Added Item #A13 Hot Tar Tack Coat Quantity 30 gallons
- Added Alternate B - Boring in Forcemain along Kronenwetter Dr.:
 - B1 - Administrative - Base Bid less Items 31,32 by 15000 LF
 - B2 – Horizontal directional bore C900-DR18 pipe with Mechanical Joint Fasteners
- Added Alternate C – Panel Change Deduct:
 - C1 - Administrative - Base Bid less NEMA 4X panel box
 - C2 – NEMA 4 Panel Boxes

CHANGES TO DRAWINGS:

REVISED SHEET B3.1 - PROPOSED SITE PLAN
REVISED SHEET E1.0 – E1.3 - ELECTRICAL DIAGRAMS & DETAILS

CLARIFICATIONS BASED ON ADDITIONAL COMMUNICATIONS:

1. *Line # 22 Hot Tar Tack Coat 500 gallons. We figure 20 gallons for this part or am I missing something?*
Response: In review of this inquiry, we identified a quantity error with this specific item. The Bid Form has been updated to reflect the quantity at 30 gal. See Item #3 of this clarification section.
2. *What size is the patch on Kowalski crossing Alt. A it says 470 ton of mix. I don't see that, please clarify.*
Response: In review of this inquiry, we identified a quantity error with this specific item. The bid form has been updated to reflect the quantity at 72 TN. Also note that the Bid Form also includes an alternative to open cut the path at Kowalski, including the 4 lanes, median, & Cul-de-sac.
3. *There is no tack coat item for Alternate A?*
Response: This was included as Item #22 in the Bid Form. Alternate A would require about 30 gals, so with lift station paving being about 20 gals, the total for both should be 50 gals in the event Alternate A would be selected.
4. *Some general contractors have asked us to provide a proposal for drilling in some of the force main as they are concerned with a high water table in the sand. Would you be open to using hdd as a method for installation?*
Response: This Addendum includes an Alternate B for the purpose of allowing a horizontal directional bore operation for the forcemain lineal footage.
5. *In the project documents a reference is made to a Geotechnical Report dated 8/1/14 that was included with the bidding documents. Do you have this report?*
Response: The Geotechnical Boring report that was inadvertently omitted from the documents. Dewatering is anticipated. The report is added within this Addendum.
6. *Can we replace NEMA 4x Panel Boxes with NEMA 4 Panel Boxes due to cost.*
Response: The intent of the project remains to provide anti-corrosion and dust-free panel boxes for controls, switches and components, however, we recognize the cost differences therefrom. Therefore, this Addendum provides for an Alternate C with the Bid Form allowing for NEMA 4 panel boxes to be included.



ATTACHMENTS:

Specification Section: 00 4100 – BID FORM AND PROPOSAL (02-26-2025)

Revised Plan Sheets:

- B3.1
- E1.0-E1.3

Reference Document: Geotechnical Report, Soil Boring Log

END OF ADDENDUM #1



SOIL BORING LOG

Boring By: Point of Beginning

Project: Kronenwetter Lift Stations
Location: 10' West of Existing lift Station
1210 Kronenwetter Dr.

Boring: 1
Auger: 3.25" HSA
Page: 1 of 2
Drillers: DC/NH
Date: 4/12/2024
Elevation: 1052.1

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N ₆₀	Rec (in.)	M	Qp (tsf)	Notes
1	-	3" of Dark Brown Silty Sand topsoil							
2	-	Brown F-M SAND Little silt Little Gravel							
3	-	(Fill)							
4	-	(USCS: SP-SM)							
5	-		1	3.5 - 5	6	12	M		
6	-								
7	-								
8	-		2	8.5 - 10	2	12	M		
9	-								
10	-								
11	-								
12	-								
13	-		3	13.5 - 15	2	12	S		
14	-								
15	-	-----15.0'-----							
16	-	Brown F-M SAND Little silt Little Gravel							
17	-	(USCS: SP-SM)							
18	-	(Water @ 15.0')							
19	-		4	18.5 - 20	2	10	S		
20	-								
21	-								
22	-								
23	-		5	23.5 - 25	2	12	S		
24	-								
25	-	(continued)							

Point of Beginning
SOIL BORING LOG

POB 24.2013

Boring By: Point of Beginning

Boring: 1
Auger: 3.25" HSA

Project: Kronenwetter Lift Stations
Location: 10' West of Existing lift Station
 1210 Kronenwetter Dr.

Page: 2 of 2
Drillers: DC/NH
Date: 4/12/2024
Elevation:

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N ₆₀	Rec (in.)	M	Qp (tsf)	Notes
26	-	(continued)							
27	-								
28	-								
29	-								
30	-								
31	-								
32	-								
33	-								
34	-								
35	-								
36	-								
37	-								
38	-								
39	-								
40	-								
41	-								
42	-								
43	-	Hard Drilling at 42.5' Probable Weathered Bedrock							
44	-								
45	-	Auger Refusal @45.0'							
46	-	E.O.B. - 45.0'							
47	-	Backfilled with Bentonite Chips							
48	-								
49	-								
50	-								

Point of Beginning
SOIL BORING LOG

POB 24.2013

**VILLAGE OF KRONENWETTER – LIFT STATION 8
ADDENDUM #2**

Date: February 28, 2025

Project: Village of Kronenwetter Lift Station 8

QuestCDN Number: #9514919

Bids Close Date: **MARCH 4, 2025 @ 11:00 AM LOCAL TIME
(NO CHANGE)
KRONENWETTER MUNICIPAL BUILDING**

This Addendum is issued to modify, explain, or correct the original Project Documents, and is hereby made part of the Project Documents. Please attach this Addendum to the Project Documents and/or distribute accordingly.

CHANGES TO SPECIFICATIONS:

NO CHANGE

CHANGES TO DRAWINGS:

REVISED SHEET E1.0 ELECTRICAL ONE-LINE DIAGRAM

- 400A Service down to 200A

CLARIFICATIONS BASED ON ADDITIONAL COMMUNICATIONS:

1. *Is there flexibility in the forcemain bid quantity completion by June 15, 2025?*
Response: There is flexibility in this date, but under the base bid, this item requires coordination with the Kronenwetter Drive contractor, for the portion on Kronenwetter Drive. Portions on Old Highway 51, Kowalski and the I39 bore, and the portion near the lift station, would not be as critical to be completed by June 15, 2025. In the case of the Alternate B for horizontal directional bore option, the Substantial Completion date for Item #31 would not be applied, as there would be limited, if any, potential damage to Kronenwetter Drive if that Alternate were selected.

ATTACHMENTS:

Revised Plan Sheet: E1.0 ELECTRICAL ONE LINE

END OF ADDENDUM #2