



City of Cooper City, Florida
ITB 2023-05-UTL Effluent Pump #3 Replacement



CITY OF COOPER CITY, FLORIDA

Invitation to Bid

Effluent Pump#3 Replacement

ITB 2023-05-UTL

For information, contact the Purchasing Division:

The Purchasing Division
954-433-4300 Ext. # 268
Purchasing@CooperCity.gov

Release Date: Friday, October 13, 2023
Due Date: Monday, November 13, 2023



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DRAWINGS

Cooper City Wastewater Treatment Plant Effluent Pump Replacement



INVITATION TO BID

CITY OF COOPER CITY
NOTICE TO BIDDERS/PROPOSERS

NOTICE IS HEREBY GIVEN that the City of Cooper City, Florida, will be accepting sealed bids until 3:00 PM (EST) on **Monday, November 13, 2023**, from qualified contractors to furnish and install a new 250-horsepower vertical turbine pump at the City's existing wastewater treatment plant effluent pump station. The proposed pump is replacing an existing 100-horsepower vertical turbine pump that was previously removed by the City. The contractor shall also furnish and install a variable frequency drive that will control the pump speed. Bidders shall comply with the terms, conditions, and specifications contained in this solicitation. The awarded vendor shall provide labor, materials, insurance, and incidentals for a complete and operable project to the City of Cooper City. This project is funded through the American Rescue Plan Act (ARPA) of 2021. Consequently, the awarded vendor shall comply with requirements of ARPA agreement number Y5181 entered into by and between the State of Florida, Division of Emergency Management and the City of Cooper City. In case of any conflict between the City's contract terms and conditions and ARPA provisions, the ARPA provisions shall prevail.

EFFLUENT PUMP #3 REPLACEMENT
ITB 2023-05-UTL

The detailed Invitation to Bid (ITB) shall be obtained online at www.DemandStar.com.

Bids must be received in the City Clerk's Office located in City Hall, 9090 SW 50th Place, Cooper City, Florida 33328 no later than **3:00PM (EST), Monday, November 13, 2023**. The outside of the envelope or box must be clearly marked "ITB 2023-05-UTL, EFFLUENT PUMP #3 REPLACEMENT" and shall contain one (1) identified, unbound original, two (2) copies and one (1) electronic copy (flash drive) of your bid/proposal.

A MANDATORY pre-bid meeting will be held on Friday, **October 25, 2023** at 2:00PM EST and located at the George A. Haughney Water Treatment Plant located at 11791 SW 49th Street, Cooper City, FL.

For questions and/or requests for information about this solicitation, please contact Purchasing@CooperCity.gov Such contact shall be for clarification purposes only. Material changes, if any, to the Scope of Services or bidding procedures will only be transmitted by written addendum. All questions must be submitted in writing. Questions of a material nature must be received prior to the cut-off date specified in the Bid/Proposal Schedule. No part of your bid/proposal can be submitted via fax or e-mail.

The City Commission of the City of Cooper City reserves the right, for any reason, to reject any and all bids/bids and to make awards in the best interest of the City.



A Cone of Silence is hereby imposed pursuant to the updated Section 2-270 of the City's Code of Ordinances, prohibiting communication regarding this Invitation to Bid between a potential contractor, vendor, service provider, bidder, lobbyist, or; consultant and the City Commissioners, City's professional staff including, but not limited to, the City Manager and staff, any member of the City's selection or evaluation committee. For further information about the Cone of Silence, please see Section 2-270 updated by Ordinance 23-15 or contact the City's Purchasing Division.

CITY OF COOPER CITY
City Clerk's Office

Please publish one (1) time on:

[Thursday, October 19, 2023](#)

Please send invoice and proof of publication to:

Tedra Allen, City Clerk
City of Cooper City
9090 SW 50th Place
Cooper City, FL 33328
Tallen@CooperCity.gov

[END OF SECTION]



SECTION I – INTRODUCTION AND INFORMATION

This solicitation may include the words “bid”, “proposal” and “offer”. These words are used interchangeably in reference to all offers submitted by prospective respondents in response to Requests for Quotes, Requests for Qualifications, Requests for Proposals and Invitations to Bid.

1.1 PURPOSE

The City of Cooper City (the “City”) will receive sealed bids on the date and time specified below for furnishing all materials/supplies, equipment, machinery, mobilization, labor, supervision, expertise, and services necessary to furnish and install a new 250-horsepower vertical turbine pump at the City’s existing wastewater treatment plant effluent pump station. The proposed pump is replacing an existing 100-horsepower vertical turbine pump that was previously removed by the City. The contractor shall also furnish and install a variable frequency drive that will control the pump speed. Bidders shall comply with the terms, conditions, and specifications contained in this solicitation. The awarded vendor shall provide labor, materials, insurance, and incidentals for a complete and operable project to the City of Cooper City. This project is funded through the American Rescue Plan Act (ARPA) of 2021. Consequently, the awarded vendor shall comply with requirements of ARPA agreement number Y5181 entered into by and between the State of Florida, Division of Emergency Management and the City of Cooper City. **In case of any conflict between the City’s contract terms and conditions and ARPA provisions, the ARPA provisions shall prevail.**

1.2 DUE DATE & SUBMITTALS

1.2.1 All bids are due no later than 3:00PM (EST), **Monday, November 13, 2023**, to the Office of the City Clerk located at 9090 SW 50th Place, Cooper City, FL 33328. Bids shall be opened and publicly read in the Commission Chambers, on the date and at the time specified.

1.2.2 Original copy of Attachment A Bid Form as well as any other pertinent Forms and documents must be returned in order for the bid to be considered for award. All bids are subject to the conditions specified herein and on the attached General Conditions, Technical Specifications, Project Drawings and Bid Form. The City encourages early submittal of bids.

1.2.3 The completed, signed bid must be submitted in a **SEALED ENVELOPE CLEARLY MARKED WITH THE BID TITLE**. Bids mistakenly opened by City staff, due to failure of the Bidder to correctly identify the package, will be rejected. Telegraphic, facsimile and email bids will not be accepted.

1.2.4 Bids received after the closing time and date, for any reason whatsoever, will not be considered. All bids received after that time will not be accepted and shall be returned to the



Bidder. Any disputes regarding timely receipt of proposals shall be decided in the favor of the City. Late bids will be rejected.

1.3 MANDATORY PRE-BID MEETING

A MANDATORY pre-bid meeting will be held on Friday, [October 25, 2023](#) at 2:00PM EST and located at the George A. Haughney Water Treatment Plant located at 11791 SW 49th Street, Cooper City, FL.

1.4 ELIGIBILITY AND COMPETENCY OF BIDDERS

1.4.1 To be eligible for award of a contract in response to this solicitation, the Bidder must demonstrate that they, or the principals assigned to the project, have successfully completed services, as specified in the Scope of Services/Technical Specifications section of this solicitation, are normally and routinely engaged in performing such services and are properly and legally licensed to perform such work.

1.4.2 Bidders are required to complete and submit with their Bid, the Qualification Requirements included in the Bid Proposal. Bidder must demonstrate qualifications to perform the Work including sufficient manpower and equipment, that previous experience meets the bid requirements, that past projects have been completed within budget and on schedule, that past projects have been managed professionally and construction quality and field supervision are professional and of best industry practice. Owner will evaluate experience and conduct reference checks as part of the bid evaluation process. Owner shall have sole opinion as to whether Bidder's requisite experience is deemed acceptable.

1.4.3 To be considered for award of this solicitation, the Bidder must demonstrate that it meets the qualifications and has the experience, capacity, and resources to successfully execute this Project. Any Bidder that fails to meet all the following requirements may be deemed "NON-RESPONSIVE". As part of their bid proposal, Bidders must submit documentation that demonstrates compliance with the following criteria:

- A. Bidders must be licensed to do business in the State of Florida. Please submit Sunbiz report with your company registered as active.
- B. Bidders submitting proposals as joint ventures shall submit a fully executed copy of their joint venture agreement. The joint venture must also comply and submit evidence of being licensed to do business in the State of Florida in order to be considered for this project.
- C. Bidders must be licensed in the State of Florida at the time of Bid submittal as a State of Florida Certified General Contractor (CG License). Submit documentation of licensure with bid.
- D. The Bidder must provide documentation of projects successfully completed as a licensed



General Contractor in the State of Florida (with a scope similar to the scope of this project) for a minimum of three (3) projects at water or wastewater treatment plants within the last ten (10) years. Submit "ATTACHMENT C REFERENCE FORM"

1.5 CONTRACT TERM

1.5.1 The term of this Agreement shall be for the duration of the project, City acceptance, and payment of the project.

1.5.2 The Contract Time allotted for this project shall be consistent with the duration specified in the Contract in [Article 3.2](#) and Technical Specifications.

1.5.3 The form and legal sufficiency of the Contract shall be subject to the approval of the City Attorney.

1.6 SUPPLY/DELIVERY LOCATION

All work proposed under this contract including but not limited to membrane replacement and associated train improvements will be performed at the City of Cooper City Wastewater Treatment Plant located at 11791 SW 49th Street, Cooper City, FL

1.7 PRICE

Bidder/Proposer warrants, by virtue of bidding, that the bid and prices quoted in the solicitation will be firm for acceptance by the City for a period of one-hundred and twenty (120) days from the bid due date unless otherwise stated herein. Bidder acknowledges that, in certain circumstances, the City may require this amount of time to evaluate and award a bid.

1.8 PRICE ADJUSTMENTS

NOT PERMITTED AND PURPOSELY OMMITTED FOR THIS SOLICITATION

1.9 METHOD OF AWARD

1.9.1 The contract will be awarded to the *lowest* responsive, responsible Bidder whose Bid, conforming to the Solicitation, is most advantageous to the City. The *lowest* responsive, responsible Bidder(s) will be determined in conjunction with the methods described below. Tie Bids will be decided as described in the General Conditions.

1.9.2 Bidder must bid on all items listed on Bid Form to qualify for award of the contract.

1.9.3 The City reserves the right to reject all bids or any portion of any bid the City deems necessary for the best interest of the City, to accept any item or group of items unless qualified by the Bidder, to acquire additional quantities at prices quoted on the Bid Form unless



additional quantities are not acceptable, in which case the Bid Form must be noted “BID IS FOR SPECIFIED QUANTITY ONLY.” All awards made as a result of this bid shall conform to applicable Florida Statutes and the City Code.

1.9.4 Bid prices should be submitted with the understanding that the City is not authorized to pay service charges, which may be imposed due to the late payment of an invoice, which has become delinquent.

1.9.5 The City shall award a contract to a Bidder through action taken by the City Commission of the City of Cooper City (the “City Commission”) at a duly authorized meeting.

1.9.6 The General Terms and Conditions, the Special Conditions, the Technical Specifications, the project drawings, the Bidder’s Proposal, the Contract referenced and the Work Authorizations are collectively an integral part of the contract between the City and the successful Bidder.

1.9.7 While the City Commission may determine to award a contract to a Bidder(s) under this Solicitation, said award may be conditional on the subsequent submission of other documents as specified in the Bid Form of this solicitation. The Bidder shall be in default of the contractual obligations if any of these documents are not submitted in a timely manner and in the form(s) required by the City. If the Bidder is in default, the City, through the Purchasing Division, will void its acceptance of the Bidder’s offer and may determine to accept the offer from the second most responsive, responsible Bidder or re-solicit Bids. The City may, at its sole option, seek monetary restitution from the Bidder as a result of damages or excess costs sustained and/or may prohibit the Bidder from submitting future Bids for a period of one year.

1.9.8 The City reserves the right to automatically extend the contract for a maximum period not to exceed one-hundred and eighty (180) calendar days, in order to provide City departments with continual service and supplies while a new contract is being solicited, evaluated and/or awarded. If this right is exercised, the City shall notify the Bidder, in writing, of its intent to extend the contract for a definitive period of time prior to the effective date of the extension. By affixing its authorized signature to this Bid Form, the Bidder hereby acknowledges and agrees to this right of the City. **[THIS SUB-SECTION NOT APPLICABLE TO THIS CONTRACT]**

1.10 INVOICES/PAYMENT

Invoices documenting completed work shall be submitted at the completion of each request for work and must contain detailed information including the location and amount of work performed. Contractor shall submit an exact listing of completed work with submission of invoice for payment.



Cooper City will withhold retainage in accordance with Florida Statute 255.075 for contracts with construction services. Retainage is calculated on the total contract cost which includes any change orders pre-approved by the City.

Every effort will be made by the City to remit payment within 25 business days of the invoice date, after satisfactory inspection by the using department. BIDDERS WILL NOT BE PERMITTED TO PICK UP CHECKS FROM THE CITY. ALL CHECKS WILL BE MAILED TO THE CONTRACTOR'S REMIT TO ADDRESS ON FILE.

Invoices shall be emailed MONTHLY to AccountsPayable@CooperCity.gov, or sent via US Mail to City of Cooper City, 9090 SW 50th Place, Cooper City, FL 33328. All invoices must reference the applicable Work Authorization and/or Bid number.

All payments shall be governed by the Local Government Prompt Payment Act, as set forth in Part VII, Chapters 218, Florida Statutes.

1.11 INFORMATION OR CLARIFICATION

For information concerning procedures for responding to this solicitation, contact the Purchasing Division via email Purchasing@CooperCityFL.org. Such contact shall be for clarification purposes only. Material changes, if any, to the Scope of Services or bidding procedures will only be transmitted by written addendum.

All questions must be submitted in writing. Questions of a material nature must be received prior to the cut-off date specified in the Bid Schedule. No part of your bid can be submitted via fax or e-mail.

1.12 WRITTEN CONTRACT

The awarded Bidder/Proposer shall be required to enter into a written Contract with the City, The Contract form shall be prepared by the City and shall incorporate the terms of this solicitation, the accepted Bid, and include a termination for convenience clause, liquidated damages clause and other terms which may be required by the City and acceptable by the City Commissioners. The Contract shall be substantially in the form attached to this solicitation. No work shall be performed or payment due unless a written Contract is fully executed and approved by the City Commissioners.

1.13 DEFINED TERMS

Terms used in these Instructions to Bidders which are defined in Article 1 of the Contract the have the meanings assigned to them in the General Conditions. The term "Successful Bidder"



means the lowest, qualified, responsible Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

1.14 BID/PROPOSAL BOND

Bids/Proposals **MUST** be accompanied by a Bid/Proposal security made payable to the City in an amount equal to five percent (5%) of the Bidder's or Proposer's maximum Bid/Proposal price and in the form of a certified check, bank money order, or a Bid/Proposal Bond (Attached) issued by an authorized surety.

The Bid/Proposal security of the Awarded Contractor will be retained until such Proposer has executed the Contract Documents, furnished the required contract security (Public Construction Bond) and met the other conditions of the Notice of Award, whereupon the Bid/Proposal Security will be returned. If the Awarded Contractor fails to execute and deliver the Contract Documents and furnish the required security within ten (10) days of the issuance of the Notice of Award, the City may consider Proposer to be in default, annul the Notice of Award, and the Bid/Proposal security of that Proposer shall be forfeited. Such forfeiture shall be City's exclusive remedy if Proposer defaults. The Bid/Proposal security of Proposers whom the Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective date of the Agreement or 61 days after the Bid/Proposal opening, whereupon the Bid/Proposal security furnished by such Proposers will be returned.

The Bid/Proposal security of Proposers whom the City believes do not have a reasonable chance of receiving the award will be returned within 21 days after the award.

THIS BID MUST BE ACCOMPANIED BY A BID BOND MADE PAYABLE TO THE CITY OF COOPER CITY, IN THE AMOUNT EQUAL TO FIVE PERCENT (5%) OF THE BID PRICE.

[END OF SECTION]



SECTION II – SOLICITATION SCHEDULE

Item	Date
Release Bid	Friday, October 13, 2023
A MANDATORY pre-bid meeting (2:00PM EST and located at the George A. Haughney Water Treatment Plant located at 11791 SW 49 th Street, Cooper City, FL.)	Friday, October 25, 2023
Last Date for Receipt of Questions of a Material Nature	Monday, November 6, 2023
BIDS DUE (Prior to 3:00PM EST)	Monday, November 13, 2023
Recommendation of Award issued to City Commission	TBD
Anticipated Award of Contract by City Commission	TBD

[END OF SECTION]



SECTION III – GENERAL CONDITIONS

These instructions are standard for all contracts for commodities or services issued through the City of Cooper City Finance Department – Purchasing Division. The City may delete, supersede, or modify any of these standard instructions for a particular contract by indicating such change in the Special Conditions, Technical Specifications, Instructions, Bid Pages, Addenda, and Legal Advertisement.

ARTICLE 1. CONTRACT DOCUMENTS

- 1.1. The Contract Documents shall be followed in strict accordance as to Work, performance, material(s), and dimensions, except when Consultant may authorize, in writing, an exception.
- 1.2. Dimensions given in figures shall predominate over scaled measurements from the Drawings; however, any discrepancies regarding figures shall be resolved by Consultant. Contractor shall not proceed when in doubt as to any dimension or measurement, but shall seek clarification from Consultant.

ARTICLE 2. INTENTION OF CITY

City intends to describe in this Contract a functionally complete Project (or part thereof) to be constructed in accordance with this Contract and in accordance with all codes and regulations governing construction of the Project. The Work is a description of Contractor's obligations and responsibilities and is deemed to include preliminary considerations and prerequisites, as well as all labor, materials, equipment, and tasks, that are such an inseparable part of the Work described that exclusion of them from the Work would render performance by Contractor impractical, illogical, or unconscionable, and shall be supplied by Contractor whether or not specifically called for. When words that have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such words shall be interpreted in accordance with that meaning, unless specified otherwise herein. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, laws, or regulations in effect at the time of opening of bids for the Project. Contractor shall comply with such specifications, manuals, codes, laws, or regulations. City will have no duties other than those duties and obligations expressly set forth within this Contract.

ARTICLE 3. PRELIMINARY MATTERS

- 3.1. At least five (5) days prior to the pre-construction meeting described in Section 3.2, Contractor shall submit to Consultant for Consultant's review and acceptance:
 - 3.1.1. A preliminary progress schedule.
 - 3.1.2. A preliminary schedule of Shop Drawing submissions; and



3.1.3. In a lump sum contract or in a contract that includes lump sum bid items of Work, a preliminary schedule of values for all of the Work that includes quantities and prices of items aggregating the Contract Price, in as much detail as may be requested by City in writing, and that subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during construction.

In addition, after award but prior to the submission of the progress schedule, Consultant, Contract Administrator, and Contractor shall meet with all utility owners and secure from them a schedule of utility relocation; provided, however, that neither Consultant nor City of Cooper City shall be responsible for the nonperformance by the utility owners.

3.2. At a time specified by Consultant, but before Contractor starts the Work at the Project site, a conference attended by Contractor, Consultant, and others as deemed appropriate by Contract Administrator, will be held to discuss the schedules referred to in Section 3.1; to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment; and to establish a working understanding among the Parties as to the Work.

3.3. Within thirty-five (35) days after the Project Initiation Date set forth in the applicable Notice to Proceed, a conference attended by Contractor, Consultant, and others, as appropriate, will be held to finalize the schedules submitted in accordance with Section 3.1. Within forty-five (45) days after the Project Initiation Date set forth in the applicable Notice to Proceed, Contractor shall revise the original schedule submittal to address all review comments from the progress schedule review conference and resubmit a revised progress schedule to Consultant for review. Consultant's acceptance of the finalized progress schedule shall only be with respect to the orderly progression of the Work to completion within the Contract Time, but such acceptance shall not constitute acceptance by City of Cooper City or Consultant of the means or methods of construction or of the sequencing or scheduling of the Work. Such acceptance will neither impose on Consultant or City of Cooper City responsibility for the progress or scheduling of the Work, nor relieve Contractor from full responsibility therefor. The finalized schedule of Shop Drawing submissions must be acceptable to Consultant as providing a workable arrangement for processing such submissions. The finalized schedule of values must be acceptable to Consultant as to form and substance.



ARTICLE 4. PERFORMANCE BOND AND PAYMENT BOND

4.1. Within ten (10) days after being notified of the award, Contractor shall furnish a Performance Bond and a Payment Bond containing all the provisions of the Performance Bond (Form 1) and Payment Bond (Form 2). The payment bond shall be in the amount of one hundred percent (100%) of the Contract Price and performance bond shall be in the amount of one hundred and ten percent (110%) of the Contract Price guaranteeing to City of Cooper City the completion and performance of the Work covered in such Contract as well as full payment of all suppliers, laborers, and Subcontractors employed pursuant to this Project. Each Bond shall be with a surety company that is qualified pursuant to Article 5.

4.2. Each Bond shall continue in effect for one (1) year after Final Completion and acceptance of the Work with liability equal to one hundred ten percent (110%) of the Contract Price, or an additional bond provided to ensure that Contractor will, upon notification by City, correct any defective or faulty Work or materials that appear within one (1) year after Final Completion of this Contract.

4.3. Pursuant to the requirements of Section 255.05, Florida Statutes, Contractor shall ensure that the bond(s) referenced above shall be recorded in the Official Records of Broward County and provide City of Cooper City with evidence of such recording.

4.4. In lieu of a Performance Bond and a Payment Bond, Contractor may furnish alternate forms of security in the form of cash, money order, certified check, cashier's check, or unconditional letter of credit. Such alternate forms of security shall be subject to the approval of City of Cooper City and for same purpose, and shall be subject to the same conditions as those applicable above, and shall be held by City of Cooper City for one (1) year after completion and acceptance of the Work.

ARTICLE 5. QUALIFICATION OF SURETY

5.1. For all Bid Bonds, Performance Bonds, and Payment Bonds over \$200,000.00:

5.1.1. Each bond must be executed by a surety company of recognized standing, authorized to do business in the State of Florida as surety, having a resident agent in the State of Florida, and having been in business with a record of successful continuous operation for at least the past five (5) years.

5.1.2. The surety company shall hold a current Certificate of Authority as acceptable surety on federal bonds in accordance with United States Department of Treasury Circular 570, Current Revisions. If the amount of the Bond exceeds the underwriting limitation set forth in the circular, in order to qualify as a proper surety herein, the net retention of the surety company shall not exceed the underwriting limitation in the circular, and the excess risks must be protected by coinsurance, reinsurance, or other methods in accordance with Treasury Circular 297, Revised (31 C.F.R. §§ 223.10, 223.11). Further, the surety company shall provide City of Cooper City with evidence



satisfactory to City of Cooper City that such excess risk has been protected in an acceptable manner.

5.1.3. A surety company that is rejected by City of Cooper City may be substituted by the Bidder or proposer with a surety company acceptable to City, but only if the bid amount does not increase.

5.1.4. All bonds shall be written through surety insurers authorized to do business in the State of Florida as surety, with the following qualifications according to the latest edition of Best’s Insurance Guide, published by AM Best Company, Oldwick, New Jersey:

Amount of Bond	Minimum Policy Holder’s Ratings Strength/Financial Size
\$500,001 to \$2,500,000	
	A / VI
\$2,500,001 to \$5,000,000	A / VII
\$5,000,001 to \$10,000,000	A / VIII
Over \$10,000,000	A / IX

5.2. For projects that do not exceed \$200,000.00, City of Cooper City may accept a Bid Bond, Performance Bond, or Payment Bond from a surety company that has twice the minimum surplus and capital required by the Florida Office of Insurance Regulation at the time the solicitation is issued, if the surety company is otherwise in compliance with the provisions of the Florida Insurance Code, and if the surety company holds a currently valid Certificate of Authority issued by the United States Department of the Treasury under Sections 9304 to 9308 of Title 31 of the United States Code. The Certificate and Affidavit (Form 4) so certifying should be submitted with the Bid Bond, Performance Bond, or Payment Bond.

5.3. More stringent requirements of any grantor agency may be set forth within the Supplemental Conditions. If there are no more stringent requirements, the provisions of this article shall apply.

ARTICLE 6. INDEMNIFICATION

Contractor shall indemnify and hold harmless City of Cooper City and its current, past, and future officers and employees (collectively, “Indemnified Party”), from liabilities, damages, losses, and costs, including, but not limited to, reasonable attorneys’ fees (collectively, a “Claim”), to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor or persons employed or utilized by Contractor in the performance of this Contract, including but not limited to Contractor’s Subcontractors, sub-subcontractors, materialmen, or agents of any tier, or any of their respective employees. To the extent considered necessary by Contract Administrator and City of Cooper City Attorney, any sums due Contractor under this Contract may be retained by City of Cooper City until all of City’s claims for indemnification pursuant to this Contract have been settled or otherwise resolved, and any



amount withheld shall not be subject to payment of interest by City. These indemnifications shall survive the term of this Contract.

ARTICLE 7. INSURANCE REQUIREMENTS

7.1. The specific insurance coverage requirements for this project are identified in the Minimum Insurance Requirements Attachment J , which is a part of the Contract Documents. For purposes of this article, the term “City” shall include City of Cooper City and its members, officials, officers, and employees.

7.2. For the duration of the Contract, Contractor shall, at its sole expense, maintain at least the minimum limits of insurance coverage designated in the Contract Documents (inclusive of any amount provided by an umbrella or excess policy) in accordance with the terms and conditions stated in this article. The required insurance coverage shall be primary and non-contributory, and 'per occurrence' based. If Contractor maintains broader coverage or higher limits than the insurance requirements stated in Attachment J, City of Cooper City shall be entitled to all such broader coverages and higher limits. City of Cooper City reserves the right at any time to review and adjust the limits and types of coverage required under this article. Contractor shall add City of Cooper City as an additional insured on all required insurance coverage.

7.3. Contractor shall maintain insurance coverage against claims relating to any act or omission by Contractor, its agents, representatives, employees, or Subcontractors in connection with the Contract. All required insurance under this article shall provide primary coverage, list City of Cooper City as an additional insured, and shall not require contribution from any City of Cooper City insurance, self-insurance or otherwise. All insurance held by City, as well as City’s self-insurance, shall be in excess of and shall not contribute to the insurance provided by Contractor. Unless prohibited by the applicable policy, Contractor waives any right to subrogation that any of Contractor’s insurers may acquire against City, and agrees to obtain same in an endorsement on all lines of insurance required of Contractor under this article including any excess or umbrella policies.

7.4. All required insurance policies must be placed with insurers or surplus line carriers authorized to conduct business in the State of Florida with an A.M. Best rating of A- or better and a financial size category class VII or greater, unless otherwise approved by City’s Risk Management Division in writing.

7.5. Contractor shall declare in writing any self-insured retentions or deductibles over the limit(s) prescribed in Attachment J , and shall submit same to City, at least fifteen (15) days prior to the effective date of the Contract or commencement of the Work for City’s written approval of such retentions or deductibles. Contractor shall be solely responsible for and shall pay any deductible or self-insured retention applicable to any claim against City. City of Cooper



City may, at any time, require Contractor to purchase coverage with a lower retention or provide proof of ability to pay losses and related investigations, claim administration, and defense expenses within the retention. Contractor agrees that any deductible or self-insured retention may be satisfied by either the named insured or City, if so elected by City, and Contractor agrees to obtain same in endorsements to the required policies.

7.6. To the extent insurance requirements are designated in the Minimum Insurance Requirements, the applicable policies shall comply with the following:

7.6.1. Commercial General Liability Insurance. Policy shall be no more restrictive than that provided by the latest edition of the standard Commercial General Liability Form (Form CG 00 01) as filed for use in the State of Florida by the Insurance Services Office (ISO), with the exception of endorsements specifically required by ISO or the State of Florida, and liability arising out of: Mold, fungus, or bacteria; Terrorism; Silica, asbestos or lead; Sexual molestation; and Architects and engineers professional liability, unless coverage for professional liability is specifically required by this Contract. City of Cooper City and Consultant shall be included on the policy (and any excess or umbrella policy) as “Additional Insureds” on a form no more restrictive than ISO form CG 20 10 (Additional Insured – Owners, Lessees, or Contractor).

7.6.2. Contractor shall maintain products or completed work coverage for a minimum of three (3) years from the date of the final completion of the Work, unless otherwise stated in the Insurance Requirements Exhibit. In that case, the term specified in the Insurance Requirements shall govern the duration of the coverage required by this paragraph.

7.6.3. Business Automobile Liability Insurance. Policy shall be no more restrictive than that provided by Section II (Liability Coverage) of the most recent version of the standard Business Auto Policy (ISO Form CA 00 01) without any restrictive endorsements, including coverage for liability contractually assumed, and shall cover all owned, non-owned, and hired autos used in connection with the performance of Work under this Contract. City of Cooper City and Consultant shall be included on the policy (and any excess or umbrella policy) as “Additional Insureds.”

7.6.4. Workers’ Compensation/Employer’s Liability Insurance. Such insurance shall be no more restrictive than that provided by the latest edition of the standard Workers’ Compensation Policy, as filed for use in Florida by the National Council on Compensation Insurance (NCCI), with the exception of endorsements required by NCCI or the State of Florida. The policy must be endorsed to waive the insurer’s right to subrogate against City of Cooper City in the manner which would result from the attachment of the NCCI form “Waiver of our Right to Recover from Others Endorsement” (Advisory Form WC 00 03 13) with City of Cooper City scheduled thereon. Where appropriate, coverage shall be included to the extent required by Applicable Law, including, but not limited to, the



Federal Employer's Liability Act, the Jones Act, and the Longshoreman and Harbor Workers' Compensation Act.

If Contractor provides all or a portion of the Workers' Compensation/Employer's Liability insurance required herein via a professional employer organization ("PEO") or employee leasing company, any such Workers' Compensation/Employer's Liability insurance provided will only be deemed acceptable solely for the purposes of insuring Contractor's enrolled employees. In addition, and notwithstanding the foregoing, in order to adequately protect City of Cooper City against injuries to uninsured employees of Subcontractors and non-enrolled employees of Contractor, Contractor must still procure, maintain, and furnish City of Cooper City with evidence of a stand-alone separate Workers' Compensation/Employer's Liability insurance policy issued with Contractor as an additional insured, and complying with all requirements for Contractor provided Workers' Compensation contained in the Contract Documents. It is permissible for Contractor to exclude payroll of leased employees from such separate Workers' Compensation/Employer's Liability insurance policy.

7.6.5. Professional Liability Insurance. Such insurance shall cover Contractor for those sources of liability arising out of the rendering or failure to render professional services in the performance of the services required in this Contract.

7.6.6. Cyber Liability, or Technology Errors and Omissions Insurance. Coverage is required for any system connected to, and, or accessible from the internet. Coverage may be included as part of the required Professional Liability Insurance. Such policy shall cover, at a minimum, the following: Data Loss and System Damage Liability; Security Liability; Privacy Liability; Privacy/Security Breach Response coverage, including Notification Expenses.

7.6.7. Environmental Pollution Liability. Such insurance shall include clean-up costs and provide coverage to Contractor for liability resulting from pollution or other environmental impairment arising out of, or in connection with, Work performed under this Contract, or which arises out of, or in connection with this Contract, including coverage for clean-up of pollution conditions and third-party bodily injury and property damage arising from pollution conditions. Such insurance shall also include Transportation Coverage and Non-Owned Disposal Sites coverage. Should policy provide coverage on a claims-made basis, the coverage shall be in force and effect to respond to all claims reported within at least three years following the period for which coverage is required, unless a longer period is indicated in the Minimum Insurance Requirements, and which claims would have been covered had the coverage been provided on an occurrence basis.

7.6.8. Property Insurance, Builder's Risk, or Installation Floater. Such insurance shall be in force and evidenced to City of Cooper City as a condition precedent to the Notice to Proceed for construction. Coverage shall be "All Risks," Completed Value form with a



deductible not to exceed Ten Thousand Dollars (\$10,000) for each claim for all perils except wind and flood. For the perils of wind and flood, Contractor shall maintain a deductible that is commercially feasible but which does not exceed five percent (5%) of the “values at risk at the time of loss” unless otherwise approved by City of Cooper City.

Sub-limits: With respect to coverage for the peril of wind, the policy shall not be subject to any sublimit less than Fifty Million Dollars (\$50,000,000) per occurrence. With respect to the peril of Flood, the policy shall not be subject to any sublimit less than Ten Million Dollars (\$10,000,000) per occurrence. Any sublimit for wind or flood lower than those identified in the foregoing must be approved by City.

Waiver of Occupancy Clause or Warranty-Policy must be specifically endorsed to eliminate any “Occupancy Clause” or similar warranty or representation that the building(s), addition(s) or structure(s) in the course of construction shall not be occupied without specific endorsement of the policy. The policy must be endorsed to provide that the Builder’s Risk coverage will continue to apply until final acceptance of the building(s), addition(s) or structure(s) by City of Cooper City.

City of Cooper City reserves the right to purchase or provide property insurance covering the materials, equipment and supplies that are intended for specific installation in the Project while such materials, equipment and supplies are located at the Project site (this coverage will be specifically to cover property under construction or similar coverage), in transit, and while temporarily located away from the Project site for the purpose of repair, adjustment or storage at the risk of one (1) of the insured parties. This coverage will not cover any of Contractor’s or Subcontractors’ tools, equipment, machinery or provide any business interruption or time element coverage to the contractors. If City of Cooper City elects to purchase property insurance or provide for coverage under its existing insurance for this Project, then in that case, the insurance required to be carried by Contractor may be modified to account for the insurance being provided by City of Cooper City, at City of Cooper City’s discretion. Such modification may also include execution of Waiver of Subrogation documentation. If a claim with respect to this Project is made upon City’s insurance policy, Contractor shall be responsible for up to the first Fifty Thousand Dollars (\$50,000) of the deductible amount for such claim.

7.7. On or before the effective date of the Contract, or at least fifteen (15) days prior to commencement of the Work, as requested by City of Cooper City, Contractor shall provide City of Cooper City with a copy of all Certificates of Insurance or other documentation sufficient to demonstrate the insurance coverage required in this article.

7.8. Contractor shall ensure that all insurance coverages required by this article remain in full force and effect without any lapse in coverage for the duration of this Contract and until all performance required by Contractor has been completed, as determined by Contract Administrator. Contractor shall provide notice to City of Cooper City of any cancellation or



modification of any required policy at least thirty (30) days prior to the effective date of cancellation or modification, and at least ten (10) days prior to the effective date of any cancellation due to nonpayment, and shall concurrently provide City of Cooper City with a copy of its updated Certificates of Insurance evidencing continuation of the required coverage(s).

7.9. If and to the extent requested by City of Cooper City, Contractor shall provide to City of Cooper City complete, certified copies of all required insurance policies and all required endorsements within thirty (30) days after City's request.

7.10. Contractor shall ensure that "City of Cooper City, 9090 SW 50th Place, Cooper City, Florida 33328" and Consultant are listed as additional insureds on all policies required under this article. City of Cooper City shall be listed as Certificate Holder.

7.11. Contractor shall require each Subcontractor to maintain insurance coverage that adequately covers the Work provided by that Subcontractor on substantially the same insurance terms and conditions required of Contractor under this article. Contractor shall ensure that all such Subcontractors comply with these requirements and that "City of Cooper City" and Consultant are named as additional insureds under the Subcontractors' applicable insurance policies. If Contractor or any Subcontractor fails to maintain the insurance required by the Contract Documents, City of Cooper City may pay any costs of premiums necessary to maintain the required coverage and deduct such costs from any payment otherwise due to Contractor. Contractor shall not permit any Subcontractor to provide services under the Contract unless and until the requirements of this section are satisfied. If requested by City of Cooper City, Contractor shall provide, within one (1) business day, evidence of each Subcontractor's compliance with this article.

ARTICLE 8. LABOR AND MATERIALS

8.1. Unless otherwise provided herein, Contractor shall provide and pay for all Materials, labor, water, tools, equipment, light, power, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.

8.2. Contractor shall at all times enforce strict discipline and good order among its employees and Subcontractors at the Project site, and shall not employ on the Project any unfit person or anyone not skilled in the Work to which they are assigned.

ARTICLE 9. ROYALTIES AND PATENTS

All fees, royalties, and claims for any invention, or pretended inventions, or patent of any article, material, arrangement, appliance, or method that may be used upon or in any manner be connected with the construction of the Work or appurtenances, are hereby included in the prices stipulated in this Contract for said Work.



ARTICLE 10. WEATHER

Extensions to the Contract Time for delays caused by the effects of inclement weather shall be submitted as a request for a change in the Contract Time pursuant to Article 40. Time extensions are justified only when rain, other inclement weather conditions, or related adverse soil conditions result in Contractor being unable to work at least fifty percent (50%) of the normal workday on controlling items of Work identified on the accepted schedule or updates to that schedule.

ARTICLE 11. PERMITS, LICENSES, AND IMPACT FEES

11.1. Except as otherwise provided within the Special Instructions for Vendors, Contractor shall secure and pay for all necessary permits and licenses required for the Work pursuant to by Applicable Law. Contractor shall be reimbursed for only the actual amount of the permit fees levied by the permitting authority and paid by the Contractor as evidenced by an invoice or other acceptable documentation issued by the permitting authority. Reimbursement to Contractor shall be on a pass-through basis and shall not include profit or overhead of Contractor. Contractor shall have and maintain appropriate Certificate(s) of Competency, valid for the Work to be performed and valid for the jurisdiction in which the Work is to be performed, for all persons working on the Project for whom a Certificate of Competency is required.

11.2. City of Cooper City shall directly pay for all impact fees levied by any municipal governmental entity with jurisdiction.

ARTICLE 12. RESOLUTION OF DISPUTES

12.1. Any actual or prospective bidder, proposer, offeror, or contractor who is aggrieved in connection with this solicitation or the award of the resulting contract may protest to the City's Procurement Division. Protests shall be submitted in writing to the Purchasing Division no later than five (5) business days after such aggrieved person knows or should have known of the facts giving rise thereto. The decision of the Purchasing Agent shall be final unless within three (3) business days from the receipt of the decision, the protestant files a written appeal with the City Manager. The Purchasing Division shall act as the City's representative, in the issuance and administration of all contracts, and shall issue and receive all documents, notices, and all correspondence relating to the bidding process. All costs accruing from a Bid/Proposal or award challenge shall be assumed by the challenger. The decision of the City Manager shall be final and conclusive. The City Manager's decision shall be binding on all parties concerned, subject to review only on the grounds that it constitutes arbitrary action, in a court of competent jurisdiction in Broward County in accordance with laws of the State of Florida.

12.2. To prevent all disputes and litigation, the Parties agree that Consultant shall decide all questions, claims, difficulties, and disputes of whatever nature that may arise relative to the technical interpretation of the Contract Documents or fulfillment of the Contract as to the



character, quality, amount, and value of any Work done or materials furnished, or proposed to be done or furnished, under or by reason of the Contract Documents, and Consultant's decisions of all claims, questions, difficulties, and disputes shall be final and binding to the extent provided in Section 12.2. Any claim, question, difficulty, or dispute that cannot be resolved by agreement of the Contract Administrator and Contractor shall be submitted to Consultant in writing within five (5) days after the date of impasse. Unless a different period of time is set forth in this Contract, Consultant shall notify the Contract Administrator and Contractor in writing of Consultant's decision within fourteen (14) days after the date of the receipt of the claim, question, difficulty, or dispute, unless Consultant requires additional time to gather information or allow the Parties to provide additional information. Except for disputes directly related to the promptness of payment as set forth in Section 5.1 of the Contract, all nontechnical administrative disputes shall be determined by the Contract Administrator pursuant to the time periods provided herein. During the pendency of any dispute and after a determination thereof, Contractor, Consultant, and Contract Administrator shall act in good faith to mitigate any potential damages, including utilization of construction schedule changes and alternative means of construction.

12.3. If the determination of a dispute under this article is unacceptable to either party, the party objecting to the determination must notify the other party in writing within ten (10) days of receipt of the written determination. The notice must state the basis of the objection and must be accompanied by a statement that any Contract Time or Contract Price adjustment claimed is the entire adjustment to which the objecting party has reason to believe it is entitled to as a result of the determination. Within sixty (60) days after Final Completion of the Work, the Parties shall participate in mediation to address all objections to any determinations and to attempt to prevent litigation. Neither party shall commence litigation prior to the expiration of the sixty (60) day mediation period. The mediator shall be mutually agreed upon by the Parties. Should any objection not be resolved in mediation, the Parties retain all their legal rights and remedies provided under State law. **A PARTY SPECIFICALLY WAIVES ALL OF ITS RIGHTS, INCLUDING, BUT NOT LIMITED TO, CLAIMS FOR CONTRACT TIME AND CONTRACT PRICE ADJUSTMENTS PROVIDED IN THE CONTRACT, INCLUDING ITS RIGHTS AND REMEDIES UNDER STATE LAW, IF SAID PARTY FAILS TO COMPLY IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS ARTICLE.**

ARTICLE 13. INSPECTION OF WORK

13.1. Consultant and City of Cooper City shall at all times have access to the Work, and Contractor shall provide proper facilities for such access and for inspecting, measuring, and testing.

13.1.1. Should the Contract Documents, Consultant's instructions, or Applicable Law require any of the Work to be specially tested or approved, Contractor shall give Consultant timely notice of readiness of the Work for testing. If the testing or approval is to be made by an authority other than City, timely notice shall be given of the date fixed for such testing. Testing shall be performed promptly, and, where practicable, at the



source of supply. If any of the Work is covered up without approval or consent of Consultant, it must, if required by Consultant, be uncovered for examination and properly restored at Contractor's expense.

13.1.2. Reexamination of any of the Work may be ordered by Consultant with prior written approval by the Contract Administrator, and if so ordered, the Work must be uncovered by Contractor. If such Work is found to be in accordance with this Contract, City of Cooper City shall pay the cost of reexamination and replacement by means of a Change Order. If such Work is not in accordance with this Contract, Contractor shall pay such cost.

13.2. Inspectors shall have no authority to permit deviations from, or to relax or waive, any of the provisions of the Contract Documents, or to delay the Project by failure to inspect the materials and Work with reasonable promptness, without the written permission or instruction of Consultant.

13.3. The payment of any compensation, the giving of any gratuity, or the granting of any favor, of any character or form, by Contractor to any inspector, directly or indirectly, is strictly prohibited, and any such act on the part of Contractor will constitute a breach of this Contract.

ARTICLE 14. SUPERINTENDENCE AND SUPERVISION

14.1. City's instructions are to be given through Consultant, which instructions Contractor must strictly and promptly follow in every case. Contractor shall keep on the Project a full-time, competent, English-speaking superintendent and any necessary assistants, all of whom must be satisfactory to Consultant. The superintendent shall not be changed except with the written consent of Consultant, unless the superintendent proves to be unsatisfactory to Contractor and ceases to be in its employ. The superintendent shall represent Contractor; all instructions given to the superintendent shall be as binding as if given to Contractor, and will be confirmed in writing by Consultant upon the written request of Contractor. Contractor shall provide efficient supervision of the Work, using its best skill and attention.

14.2. On a daily basis, Contractor's superintendent shall record, at a minimum, the following information in a bound log: the day; date; weather conditions and how any weather condition affected progress of the Work; time of commencement of Work for the day; the Work being performed; materials, labor, personnel, equipment and Subcontractors at the Project site; visitors to the Project site, including representatives of City, Consultant, or regulatory representatives; any event that caused or contributed a delay to the critical path of the Project; any special or unusual conditions or occurrences encountered; and the time of termination of Work for the day. All information shall be recorded in the daily log in ink, unless otherwise approved by Consultant. The daily log shall be kept on or accessible from the Project site and shall be available at all times for inspection and copying by City of Cooper City and Consultant.



14.3. The Contract Administrator, Contractor, and Consultant shall meet at least every two (2) weeks (or as otherwise determined by the Contract Administrator) during the course of the Work to review and agree upon the Work performed to date and to establish the controlling items of Work for the next two (2) weeks. Consultant shall publish, keep, and distribute minutes and any comments thereto of each such meeting.

14.4. If Contractor, in the course of performing the Work, finds any discrepancy between this Contract and the physical conditions of the locality, or any errors, omissions, or discrepancies in this Contract, it shall be Contractor's duty to immediately inform Consultant, in writing, and Consultant will promptly review same. Any Work done after such discovery, until authorized, will be done at Contractor's sole risk, without entitlement to reimbursement or compensation.

14.5. Contractor shall supervise 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 this Contract. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

ARTICLE 15. CITY'S RIGHT TO TERMINATE CONTRACT

15.1. The Contract Administrator may give notice in writing to Contractor and its Surety of delay, neglect, or default, specifying the same with a notice to cure, upon the occurrence of any of the following:

15.1.1. Contractor fails to begin the Work within fifteen (15) days after the Project Initiation Date;

15.1.2. Contractor fails to perform the Work with sufficient workers, equipment, or materials to ensure the prompt completion of the Work;

15.1.3. Contractor performs the Work unsuitably or causes it to be rejected as defective and unsuitable;

15.1.4. Contractor discontinues performance of the Work in contravention of the accepted schedule;

15.1.5. Contractor fails to perform any material term set forth in this Contract;

15.1.6. Contractor becomes insolvent or declared bankrupt, commits any act of bankruptcy or insolvency, or makes an assignment for the benefit of creditors; or

15.1.7. From any other cause whatsoever, Contractor fails to carry on the Work in an acceptable manner.

15.2. If Contractor, within a period of ten (10) days after such notice, does not proceed to cure in accordance therewith, then City's awarding authority for this Contract may, upon



written certification from Consultant of the fact of such delay, neglect, or default and Contractor's failure to comply with such notice, terminate the services of Contractor, exclude Contractor from the Project site and take the performance of the Work out of the hands of Contractor, and appropriate or use any or all materials and equipment on the Project site as may be suitable and acceptable. In such case, Contractor shall not be entitled to receive any further payment until the Project is completed. In addition, City of Cooper City may enter into an agreement for the completion of the Project according to the terms and provisions of this Contract, use such other methods as in the Contract Administrator's sole opinion shall be required for the completion of the Project according to the terms and provisions of this Contract, or use such other methods as in the Contract Administrator's sole opinion shall be required for the completion of the Project in an acceptable manner. All damages, costs, and charges incurred by City, together with the costs of completing the Project, shall be deducted from any monies due or which may become due to Contractor. If the damages and expenses so incurred by City of Cooper City shall exceed the unpaid balance, Contractor shall be liable and shall pay to City of Cooper City the amount of said excess.

15.3. If City of Cooper City erroneously, improperly, or unjustifiably terminates for cause, such termination shall be deemed a termination for convenience and the rights and obligations of City of Cooper City and Contractor shall be the same as if the termination had been exercised pursuant to the Termination for Convenience clause as set forth in Section 15.4 below.

15.4. This Contract may be terminated for convenience, for any reason or no reason, in writing by the Board with at least ten (10) days' advance written notice to Contractor (delivered by certified mail, return receipt requested) of intent to terminate and the date on which such termination becomes effective. Unless otherwise stated in this Contract, if this Contract was approved by Board action, termination for cause by City of Cooper City must be by action of the Board or the City Manager; in any other instance, termination for cause may be by the City Manager, the City of Cooper City representative expressly authorized under this Contract, or the City of Cooper City representative (including any successor) who executed the Contract on behalf of City. If this Contract is terminated by City of Cooper City pursuant to this section, Contractor shall be paid for all Work properly executed and actual expenses incurred prior to termination in addition to termination settlement costs reasonably incurred by Contractor relating to commitments that had become firm prior to the termination. Payment shall include reasonable profit for Work and services performed as limited by Article 39 hereof. All actual expenses incurred shall have sufficient back-up documentation to verify that such expenses were actually incurred by Contractor. No payment shall be made for profit for Work and services that Contractor has not performed. Contractor acknowledges that it has received good, valuable, and sufficient consideration for City's right to terminate this Contract for convenience including in the form of City's obligation to provide advance notice to Contractor of such termination in accordance with this Section 15.4.

15.5. Upon receipt of a notice of termination pursuant to Sections 15.2, 15.4, or 15.6, Contractor shall promptly discontinue all affected Work unless the notice of termination directs otherwise, and shall deliver or otherwise make available to City of Cooper City all data,



drawings, specifications, reports, estimates, summaries, and such other information as may have been required by this Contract whether completed or in process.

15.6. This Contract may be terminated by the City:

15.6.1. If Contractor is a “scrutinized company” pursuant to Sections 215.473 or 215.4725, Florida Statutes, if Contractor is placed on a “discriminatory vendor list” pursuant to Section 287.134, Florida Statutes, or if Contractor is otherwise ineligible to transact business with City of Cooper City under Applicable Law or provides a false certification submitted pursuant to Section 287.135, Florida Statutes.

ARTICLE 16. SUSPENSION OF WORK

Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with City of Cooper City. No Work shall be delayed or postponed pending resolution of any disputes or disagreements except as Contractor and City of Cooper City may otherwise agree in writing. Suspension of Work by Contractor during any dispute or disagreement with City of Cooper City shall entitle City of Cooper City to terminate this Contract for cause.

ARTICLE 17. PROJECT RECORDS AND RIGHT TO AUDIT

17.1. Audit Rights and Retention of Records. Contractor and all Subcontractors shall preserve all Contract Records (as defined below) for a minimum period of three (3) years after expiration or termination of this Contract or until resolution of any audit findings, whichever is longer. This article shall survive any dispute or litigation between the Parties, and Contractor expressly acknowledges and agrees to be bound by this article throughout the course of any dispute or litigation with City. Contract Records shall, upon reasonable notice, be open to City of Cooper City inspection and subject to audit and reproduction during normal business hours. City of Cooper City audits and inspections pursuant to this article may be performed by any City of Cooper City representative (including any outside representative engaged by City). City of Cooper City may conduct audits or inspections at any time during the term of this Contract and for a period of three years after the expiration or termination of this Contract (or longer if required by Applicable Law). City of Cooper City may, without limitation, verify information, payroll distribution, and amounts through interviews, written affirmations, and on-site inspection with Contractor’s employees, Subcontractors, vendors, or other labor.

City of Cooper City shall have the right to audit, review, examine, inspect, analyze, and make copies of all Contract Records at a location within Broward County. City of Cooper City reserves the right to conduct such audit or review at Contractor’s place of business, if deemed appropriate by City of Cooper City, with seventy-two (72) hours’ advance notice. Contractor agrees to provide adequate and appropriate workspace for such review. Contractor shall provide City of Cooper City with reasonable access to Contractor’s facilities, and City of Cooper City shall be allowed to interview all current or former employees to discuss matters pertinent



to the performance of this Contract. Contractor shall make all Contract Records available electronically in common file formats or via remote access if, and to the extent, requested by City of Cooper City.

17.2. Contract Records include any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, daily diaries, drawings, receipts, vouchers and memoranda, and any and all other documents that pertain to rights, duties, obligations, or performance under this Contract. Contract Records include hard copy and electronic records, written policies and procedures, time sheets, payroll records and registers, cancelled payroll checks, estimating work sheets, correspondence, invoices and related payment documentation, general ledgers, insurance rebates and dividends, and any other records pertaining to rights, duties, obligations or performance under this Contract, whether by Contractor or Subcontractors, or otherwise necessary to adequately permit evaluation and verification of any or all of the following:

- a) Compliance with Contract
- b) Compliance with the City Code
- c) Compliance with Contract provisions regarding the pricing of Change Orders
- d) Accuracy of Contractor representations regarding the pricing of invoices
- e) Accuracy of Contractor representations related to claims submitted by Contractor including Subcontractors, or any of its other payees.

In addition to the normal documentation Contractor typically furnishes to City of Cooper City, in order to facilitate efficient use of City of Cooper City resources when reviewing or auditing Contractor’s billings and related reimbursable cost records, Contractor agrees to furnish (upon request) the following types of information in the specified computer readable file format(s):

Type of Record	File format
Monthly Job Cost Detail	.pdf and Excel
Detailed Job Cost History to Date	.pdf and Excel
Monthly Labor Distribution detail (if not already separately detailed in the Job Cost Detail)	.pdf and Excel
Total Job to Date Labor Distribution detail (if not already included in the detailed Job Cost History to date)	.pdf and Excel
Employee Timesheets documenting time worked by all individuals who charge reimbursable time to the project	.pdf
Daily Foreman Reports listing names and hours and tasks of personnel who worked on the project	.pdf
Daily Superintendent Reports	.pdf
Detailed Subcontract Status Reports (showing original subcontract value, approved subcontract change orders, subcontractor invoices, payment to Subcontractors, etc.	.pdf and Excel



Type of Record	File format
Copies of Executed Subcontracts with all Subcontractors	.pdf
Copies of all executed Change Orders issued to Subcontractors	.pdf
Copies of all documentation supporting reimbursable job costs (Subcontractor payment applications, vendor invoices, internal cost charges, etc.)	.pdf

17.3. Contractor shall, by written contract, require all Subcontractors to agree to the requirements and obligations of this article.

17.4. Any incomplete or incorrect entry in such books, records, and accounts shall be a basis for City’s disallowance and recovery of any payment reliant upon such entry.

17.5. If an audit inspection or examination in accordance with this article reveals overpricing or overcharges to City of Cooper City of any nature by Contractor or its Subcontractors in excess of five percent (5%) of the total contract billings reviewed by City of Cooper City, in addition to making adjustments for the overcharges, Contractor shall pay the reasonable cost of City’s audit. Any adjustments or payments due as a result of any such audit or inspection shall be made within thirty (30) days after presentation of City’s findings to Contractor.

ARTICLE 18. RIGHTS OF VARIOUS INTERESTS

Whenever work being done by City’s forces or by other contractors is contiguous to or within the limits of Work covered by this Contract, the respective rights of the various interests involved shall be established by the Contract Administrator to secure the completion of the various portions of the Work in general harmony.

ARTICLE 19. EXPLOSIVES

When the use of explosives is necessary in performance of the Work, Contractor shall exercise the utmost care in the handling and usage of such explosives for the protection of life and property. All explosives shall be stored in a safe manner in storage clearly marked “Dangerous-Explosives,” and shall be placed in the care of competent watchmen. When the use of explosives becomes necessary, Contractor shall furnish to City of Cooper City proof of insurance coverage, adequately providing public liability and property damage insurance as a rider attached to its regular policies, unless otherwise included in the policies themselves.

ARTICLE 20. DIFFERING SITE CONDITIONS

If during the course of the Work Contractor encounters (1) subsurface or concealed conditions at the Project site that differ materially from those shown in the Contract Documents and from those ordinarily encountered and generally recognized as inherent in work of the character called for in this Contract; or (2) unknown physical conditions of the Project site, of an unusual nature, which differ materially from that ordinarily encountered and generally recognized as inherent in work of the character called for in this Contract, then Contractor, without disturbing



the conditions and before performing any Work affected by such conditions, shall, within twenty-four (24) hours of their discovery, notify Contract Administrator and Consultant in writing of the existence of the aforesaid conditions. Consultant and Contract Administrator shall, within two (2) business days after receipt of Contractor's written notice, investigate the site conditions identified by Contractor. If, in the sole opinion of Contract Administrator, the conditions do materially so differ and cause an increase or decrease in Contractor's cost of, or the time required for, the performance of any part of the Work, whether or not charged as a result of the conditions, Contract Administrator may recommend an equitable adjustment to the Contract Price, or the Contract Time, or both. If Contract Administrator and Contractor cannot agree on an adjustment in the Contract Price or Contract Time, the adjustment shall be referred to Consultant for determination in accordance with the provisions of Article 12. No request by Contractor for an equitable adjustment to this Contract under this provision shall be allowed unless Contractor has given written notice to Contract Administrator in strict accordance with the provisions of this article. **No request for an equitable adjustment or change to the Contract Price or Contract Time for differing site conditions shall be allowed if made after the date certified by Contract Administrator as the date of Substantial Completion.**

ARTICLE 21. PLANS AND WORKING DRAWINGS

City of Cooper City, through Consultant, shall have the right to modify the details of the plans and specifications and to supplement the plans and specifications with additional plans, drawings, or additional information as the Work proceeds, all of which shall be considered as part of this Contract. In case of disagreement between the written and graphic portions of this Contract, the written portion shall govern.

ARTICLE 22. CONTRACTOR TO CHECK PLANS, SPECIFICATIONS, AND DATA

Contractor shall verify all dimensions, quantities, and details shown on the plans, specifications or other data received from Consultant, and shall notify Consultant of all errors, omissions, or discrepancies found therein within three (3) days after discovery. Contractor will not be allowed to take advantage of any error, omission, or discrepancy to not stop or delay Work, because Consultant will advise Contractor how to proceed to avoid stoppage or delay of Work. Contractor shall not be liable for damages resulting from errors, omissions, or discrepancies in this Contract unless Contractor recognized such error, omission, or discrepancy, and failed to report it to Consultant.

ARTICLE 23. CONTRACTOR'S RESPONSIBILITY FOR DAMAGES AND ACCIDENTS

23.1. Contractor shall accept full responsibility for the Work against all loss or damage of whatsoever nature sustained until final acceptance by City of Cooper City, and shall promptly repair any damage done from any cause whatsoever, except as provided in Article 30.



23.2. Contractor shall be responsible for all Materials, equipment and supplies pertaining to the Project. If any such Materials, equipment or supplies are lost, stolen, damaged, or destroyed prior to final acceptance by City of Cooper City, Contractor shall replace same without cost to City, except as provided in Article 30.

ARTICLE 24. WARRANTY

24.1 Contractor warrants to City of Cooper City that all Materials and equipment furnished under this Contract will be new unless otherwise specified and that all of the Work will be of good quality, free from faults and defects, and in conformance with this Contract. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by Consultant, Contractor shall furnish satisfactory evidence as to the kind and quality of Materials and equipment. This warranty is not limited by the provisions of Article 26 herein.

24.2 Project specific warranty requirements for workmanship, materials and equipment furnished under this Contract are provided in the Project Technical Specifications

ARTICLE 25. SUPPLEMENTARY DRAWINGS

25.1. When, in the opinion of Consultant, it becomes necessary to explain the Work to be done more fully, or to illustrate the Work further, or to show any changes that may be required, supplementary drawings, with specifications pertaining thereto, will be prepared by Consultant.

25.2. The supplementary drawings shall be binding upon Contractor with the same force as this Contract. Where such supplementary drawings require either less or more than the original quantities of Work, appropriate adjustments shall be made by Change Order.

ARTICLE 26. DEFECTIVE WORK

26.1. Consultant has the authority to reject or disapprove Work that Consultant finds to be defective. If required by Consultant, Contractor shall promptly either correct all defective Work or remove such defective Work and replace it with non-defective Work. Contractor shall bear all direct, indirect, and consequential costs of such removal or corrections including cost of testing laboratories and personnel.

26.2. Should Contractor fail or refuse to remove or correct any defective Work or to make any necessary repairs in accordance with the requirements of this Contract within the time indicated in writing by Consultant, City of Cooper City shall have the authority to cause the defective Work to be removed or corrected, or make such repairs as may be necessary, at Contractor's expense. Any expense incurred by City of Cooper City in making such removals, corrections, or repairs, shall, at City's election, be paid for out of any monies due or which may become due to Contractor or charged against the Performance Bond. In the event of failure of Contractor to make all necessary repairs promptly and fully, City of Cooper City may declare Contractor in default.



26.3. If, within one (1) year after Substantial Completion or such longer period of time as may be prescribed by the terms of any applicable special warranty required by this Contract, or by any specific provision of this Contract, any of the Work is found to be defective or not in accordance with this Contract, Contractor, after receipt of written notice from City of Cooper City, shall promptly correct such defective or nonconforming Work within the time specified by City, without cost to City. Nothing contained herein shall be construed to establish a period of limitation with respect to any other obligation that Contractor might have under this Contract, including, but not limited to, Article 24 hereof and any claim regarding latent defects.

26.4. Failure to reject any defective Work or material shall not in any way prevent later rejection when such defect is discovered, nor shall such failure obligate City of Cooper City to final acceptance.

ARTICLE 27. TAXES

Contractor shall pay all applicable sales, consumer, use, and other taxes required by Applicable Law. Contractor is responsible for reviewing the pertinent state statutes involving state taxes and complying with all their requirements.

ARTICLE 28. SUBCONTRACTS

28.1. Each Subcontractor must possess certificates of competency and licenses required by Applicable Law. Contractor shall notify the Contract Administrator and Consultant of any change in Subcontractors.

28.2. Contractor shall not employ any Subcontractor against whom City of Cooper City or Consultant may have a reasonable objection. Contractor shall not be required to employ any Subcontractor against whom Contractor has a reasonable objection.

28.3. Contractor shall be fully responsible for all acts and omissions of its Subcontractors, persons directly or indirectly employed by its Subcontractors, and persons for whose acts any of its Subcontractors may be liable to the same extent that Contractor is responsible for the acts and omissions of persons directly employed by it. Nothing in this Contract shall create any contractual relationship between any Subcontractor and City of Cooper City or any obligation on the part of City of Cooper City to pay or to see the payment of any monies due any Subcontractor. City of Cooper City or Consultant may furnish to any Subcontractor evidence of amounts paid to Contractor on account of specific Work performed.

28.4. Contractor shall bind specifically every Subcontractor to the applicable terms and conditions of this Contract for the benefit of City.

28.5. Contractor shall perform the Work with its own organization, amounting to not less than _____ percent (___%) of the Contract Price.



ARTICLE 29. SEPARATE CONTRACTS

29.1. City of Cooper City has the right to enter into contracts with other parties in connection with this Project. Contractor shall afford such other parties reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate this Work with theirs.

29.2. If any part of Contractor's Work depends for proper execution or results on the work of any third parties, Contractor shall inspect and promptly report to Consultant any defects in such work that render it unsuitable for such proper execution and results of Contractor's Work. Contractor's failure to so inspect and report shall constitute an acceptance of the third party's work as fit and proper for the performance of Contractor's Work, except as to defects which may develop in the third parties' work after the execution of Contractor's Work.

29.3. Contractor shall conduct its operations and take all reasonable steps to coordinate the prosecution of the Work so as to not interfere with or impact any other contractor on the site. Should such interference or impact occur, Contractor shall indemnify City of Cooper City from any liability to the affected contractor related to such interference or impact.

29.4. To ensure the proper execution of subsequent Work, Contractor shall inspect the Work already in place and shall immediately report to Consultant any discrepancy between the executed Work and the requirements of this Contract.

ARTICLE 30. USE OF COMPLETED PORTIONS

30.1. City of Cooper City has the right at its sole option to take possession of and use any completed or partially completed portions of the Project ("Designated Area"). Such possession and use shall not be deemed an acceptance of any of the Work not completed in accordance with this Contract. If such possession and use increase the cost of or delays the Work, Contractor shall be entitled to reasonable extra compensation or reasonable extension of time or both, as recommended by Consultant and approved by City.

30.2. If City of Cooper City decides to take possession of any completed or partially completed portions of the Project, the following shall occur:

30.2.1. City of Cooper City shall give notice to Contractor in writing at least thirty (30) days prior to City's intended occupancy of a Designated Area.

30.2.2. Contractor shall complete to the point of Substantial Completion the Designated Area, including required training, and request inspection and issuance of a Certificate of Substantial Completion (Form 10) from Consultant.

30.2.3. Upon Consultant's issuance of a Certificate of Substantial Completion for the Designated Area, City of Cooper City will assume full responsibility for maintenance,



utilities, subsequent damages of City of Cooper City and public, adjustment of insurance coverages, and start of warranty for the Designated Area.

30.2.4. Contractor shall complete all items noted on the Certificate of Substantial Completion within the time specified by Consultant on the Certificate of Substantial Completion, and request final inspection and final acceptance of the portion of the Work occupied. Upon completion of final inspection and receipt of an application for final payment, Consultant shall issue a Final Certificate of Payment relative to the Designated Area.

30.2.5. If City of Cooper City decides to occupy or use a portion or portions of the Work prior to Substantial Completion thereof, such occupancy or use shall not commence prior to a time mutually agreed upon by City of Cooper City and Contractor and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. Insurance on the unoccupied or unused portion or portions shall not be canceled or lapsed on account of such partial occupancy or use. Consent of Contractor and of the insurance company or companies to such occupancy or use shall not be unreasonably withheld.

ARTICLE 31. LANDS OF WORK

31.1. City of Cooper City shall provide, as may be indicated in this Contract, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands as are designated by City of Cooper City for the use of Contractor.

31.2. Contractor shall obtain, at Contractor's own expense and without liability to City, any additional rights to land and access thereto that may be required for temporary construction facilities, temporary easements, or for storage of materials. Contractor shall furnish to City of Cooper City copies of written permission obtained by Contractor from the owners of such land.

ARTICLE 32. LEGAL RESTRICTIONS AND TRAFFIC PROVISIONS

Contractor shall conform to and obey all Applicable Law with regard to labor, hours of work, and Contractor's operations. Contractor shall conduct its operations so as not to close any thoroughfare, nor interfere in any way with traffic on railway, highways, or water, without the written consent of the proper authorities.

ARTICLE 33. LOCATION AND DAMAGE TO EXISTING FACILITIES, EQUIPMENT, OR UTILITIES

33.1. Utility lines in the Project area have been shown on the Plans. However, City of Cooper City does not represent or warrant that all lines are shown, or that the ones indicated are in their true location. Contractor must identify and locate all underground and overhead utility lines or equipment affecting or affected by the Project. Contractor will not be entitled to any additional payment or extension of time due to discrepancies between actual location of utilities and Plan location of utilities.



33.2. Contractor shall notify each utility company with facilities in the Project site, at least thirty (30) days prior to the start of construction, to arrange for positive underground location, relocation, or support of its utility where that utility may be in conflict with or endangered by the Work. The cost of relocation of water mains or other utilities for the convenience of Contractor shall be paid by Contractor. All charges by utility companies for temporary support of its utilities shall be paid for by Contractor. All costs of permanent utility relocation to avoid conflict shall be the responsibility of the utility company involved. Contractor will not be entitled to any additional payment or extension of time for utility relocations, regardless of reason for relocation.

33.3. Contractor shall schedule the Work in such a manner that the Work is not delayed by the utility providers relocating or supporting their utilities. Contractor shall coordinate its activities with any and all public and private utility providers occupying the right-of-way. Contractor will not be entitled to any additional compensation or extension of time for any delay associated with utility relocation or support.

33.4. Contractor shall protect all overhead, surface, or underground structures and utilities from damage or displacement. Contractor will promptly and completely repair all damage to such structures within a reasonable time. All damaged utilities must be replaced or fully repaired to the satisfaction of the utility owner. All repairs are to be inspected by the utility owner prior to backfilling. City of Cooper City reserves the right to remedy such damage by making such repairs or causing such repairs to be made at the expense of Contractor. City's expense in causing such repairs shall be deducted from Contractor's next Application for Payment.

ARTICLE 34. VALUE ENGINEERING

Contractor may request substitution of Materials, articles, pieces of equipment, or any changes that reduce the Contract Price by making such request to Consultant in writing. Consultant will be the sole judge of the acceptability of any proposed substitute, and no substitute will be ordered, installed, used, or initiated without Consultant's prior written acceptance by a Change Order or an approved Shop Drawing. In no event will any substitution accepted by Consultant result in an increase in the Contract Price or Contract Time. By making a request for substitution, Contractor agrees to pay directly to Consultant all Consultant's fees and charges related to Consultant's review of the request for substitution, regardless of whether the request for substitution is accepted by Consultant. Any substitution submitted by Contractor must meet the form, fit, function, and life cycle criteria of the item proposed to be replaced, and there must be a reduction in Contract Price including Consultant review fees and charges. Unless otherwise indicated in the relevant Change Order, if a substitution is approved, the net dollar savings shall be shared equally between Contractor and City of Cooper City and processed as a deductive Change Order. City of Cooper City may require Contractor to furnish, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute approved after award of this Contract.



ARTICLE 35. PAYMENT BY CITY FOR TESTS

Except when otherwise specified in the Contract Documents, the expense of all tests shall be borne by City of Cooper City and be performed by a testing firm selected by City. Contractor is responsible for reimbursement to City of Cooper City the costs of any required test in which the tested Work fails. For road construction projects, the procedure for making tests required by City of Cooper City will be in conformance with the most recent edition of the State of Florida, Department of Transportation Standard Specifications for Road and Bridge Construction.

ARTICLE 36. CHANGE IN THE WORK OR TERMS OF CONTRACT

36.1. Without invalidating this Contract and without notice to any surety, City has the right to make such increases, decreases, or other changes in the character or quantity of the Work as may be considered necessary or desirable by City to fully and acceptably complete the proposed Work in a satisfactory manner. Any extra or additional Work within the scope of this Project must be accomplished by means of appropriate Field Orders and Supplemental Instructions or Change Orders.

36.2. Any changes to the terms of this Contract must be contained in a written document, executed by the Parties hereto, with the same formality and of equal dignity as this Contract prior to the initiation of any Work described in such change. This section shall not prohibit the issuance of Change Orders executed only by City, as provided in this Contract.

ARTICLE 37. FIELD ORDERS AND SUPPLEMENTAL INSTRUCTIONS

37.1. The Contract Administrator, through Consultant, shall have the right to approve and issue Field Orders setting forth written interpretations of the intent of this Contract and ordering minor changes in the Work. Field Orders may not change the Contract Price or the Contract Time.

37.2. Consultant shall have the right to approve and issue Supplemental Instructions setting forth written orders, instructions, or interpretations concerning the Contract Documents or performance of the Work. Supplemental Instructions may not change the Contract Price or the Contract Time.

ARTICLE 38. CHANGE ORDERS

38.1. Changes in the quantity or character of the Work within the scope of the Project that cannot be accomplished by means of Field Orders or Supplemental Instructions, including all changes resulting in changes to the Contract Price or the Contract Time, shall be authorized only by Change Orders approved in advance and issued in accordance with the provisions of the City of Cooper City Procurement Code, as amended from time to time.

38.2. Contractor shall not start work on any changes requiring an increase in the Contract Price or the Contract Time until a Change Order setting forth the adjustments is approved by



City. Upon receipt of a Change Order, Contractor shall promptly proceed with the Work set forth in the Change Order.

38.3. If satisfactory adjustment cannot be reached for any item requiring a change in the Contract Price or Contract Time, and a Change Order has not been issued, City of Cooper City may, at its sole option, either terminate this Contract as it applies to the items in question and make such arrangements as City of Cooper City deems necessary to complete the work associated with the disputed item or submit the matter in dispute to Consultant as set forth in Article 12.

38.4. Under circumstances determined necessary by City of Cooper City, Change Orders may be issued unilaterally by City of Cooper City. During the pendency of the dispute, and upon receipt of a Change Order from City of Cooper City, Contractor shall promptly proceed with the change in the Work involved and advise Consultant and Contract Administrator in writing within seven (7) days after receipt of the Change Order of Contractor's agreement or disagreement with the method, if any, provided in the Change Order for determining the proposed adjustment in the Contract Price or Contract Time.

38.5. On approval of any Contract change increasing the Contract Price, Contractor shall promptly ensure that the performance bond and payment bond are increased so that each reflects the total Contract Price as increased. Contractor will promptly provide City of Cooper City such updated bonds.

ARTICLE 39. VALUE OF CHANGE ORDER WORK

39.1. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

39.1.1. If the Work involved is covered by unit prices contained in this Contract, by application of unit prices to the quantities of items involved, subject to the provisions of Section 39.7.

39.1.2. By mutual acceptance of a lump sum, which sum Contractor and City of Cooper City acknowledge contains a component for overhead and profit.

39.1.3. On the basis of the "Cost of Work," determined as provided in Sections 39.2 and 39.3, plus a Contractor's fee for overhead and profit as determined in Section 39.4.

39.2. The term "Cost of Work" means the sum of all direct costs necessarily incurred and paid by Contractor (or, if applicable, Subcontractor) in the proper performance of the Work described in the Change Order. Except as otherwise may be agreed to in writing by City, such costs shall be in amounts no higher than those prevailing in the locality of the Project; shall include only the following items; and shall not include any of the costs itemized in Section 39.3.



39.2.1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work described in the Change Order under schedules of job classifications agreed upon by City of Cooper City and Contractor. Payroll costs for employees not employed full time on the Work covered by the Change Order 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, vacation and holiday pay application thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing the Work after regular working hours, on Sunday or legal holidays, shall be included in the above to the extent authorized in advance by City.

39.2.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and manufacturers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless City of Cooper City deposits funds with Contractor to make payments, in which case the cash discounts shall accrue to City of Cooper City. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment shall accrue to City, and Contractor shall make provisions so that they may be obtained. Rentals of all construction equipment and machinery, and the parts thereof, whether rented by Contractor, in accordance with rental agreements approved by City of Cooper City with the advice of Consultant, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof, all in accordance with the terms of said agreements. City of Cooper City will not be responsible for the cost of the rental of any such equipment, machinery, or parts when the use thereof is no longer necessary for the Work.

39.2.3. If required by City of Cooper City, Contractor shall obtain competitive bids from Subcontractors acceptable to Contractor, and shall deliver such bids to City of Cooper City who will then determine, with the advice of Consultant, which bids will be accepted. If the subcontract provides that the Subcontractor is to be paid on the basis of Cost of Work plus a fee, the Subcontractor's Cost of Work shall be determined in the same manner as Contractor's Cost of Work. All Subcontractors shall be subject to the other provisions of this Contract insofar as applicable.

39.2.4. Cost of special consultants, including, but not limited to, engineers, architects, testing laboratories, and surveyors employed for services specifically related to the performance of the work described in the Change Order.

39.2.5. Supplemental costs including the following:

39.2.5.1. All materials, supplies, equipment, machinery, appliances, office and temporary facilities, including transportation and maintenance thereof, at the



site and hand tools not owned by the workers used in the performance of the Work, less market value of such items used but not consumed, and which items remain the property of Contractor.

39.2.5.2. Sales, use, or similar taxes related to the Work, imposed by any governmental authority, for which Contractor is liable.

39.2.5.3. The cost of utilities, fuel, and sanitary facilities at the site.

39.2.5.4. Cost of premiums for additional bonds and insurance required because of changes in the Work.

39.3. The term “Cost of Work” shall not include any of the following:

39.3.1. Payroll costs and other compensation of Contractor’s officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, schedulers, lawyers, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by Contractor whether at the site or in its principal or a branch office, for general administration of the Work that are not specifically included in the agreed-upon schedule of job classifications referred to in subsection 39.2.1, all of which payroll costs and other compensation are to be considered administrative costs covered by Contractor’s fee.

39.3.2. Expenses of Contractor’s principal and branch offices other than Contractor’s field office at the Project site.

39.3.3. Any part of Contractor’s capital expenses, including but not limited to interest on Contractor’s capital employed for the Work as well as charges against Contractor for delinquent payments.

39.3.4. Cost of premiums for all bonds and for all insurance, whether Contractor is required by this Contract to purchase and maintain the same, except for additional bonds and insurance required because of changes in the Work.

39.3.5. Costs due to the negligence or neglect of Contractor, any Subcontractors, 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 repairing or remedying any damage to property.

39.3.6. Other overhead or general expense costs of any kind.

39.4. Contractor’s fee for overhead and profit shall be determined as follows:



39.4.1. A mutually acceptable fixed fee, or if no fixed fee can be agreed upon;

39.4.2. A fee based on the following percentages of the various portions of the cost of the Work:

39.4.2.1. For costs incurred under subsections 39.2.1 and 39.2.2, Contractor's fee shall not exceed ten percent (10%).

39.4.2.2. For costs incurred under subsection 39.2.3, Contractor's fee shall not exceed seven and one-half percent (7.5%); and if a subcontract is on the basis of cost of the work plus a fee, the maximum allowable to the Subcontractor as a fee for overhead and profit shall not exceed ten percent (10%); and

39.4.2.3. No fee shall be payable on the basis of costs itemized under subsections 39.2.4 and 39.2.5 (except subsection 39.2.5.3) and Section 39.3.

39.5. The amount of credit to City of Cooper City for any change that results in a net decrease in cost will be the amount of the actual net decrease. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase, if any. Contractor shall not be entitled to claim lost profits for any Work not performed.

39.6. Whenever the cost of any Work is to be determined pursuant to Sections 39.2 and 39.3, Contractor will submit in a form acceptable to Consultant an itemized cost breakdown together with the supporting data.

39.7. If the quantity of any item of the Work covered by a unit price is increased or decreased by more than twenty percent (20%) from the quantity of such Work indicated in this Contract, an appropriate Change Order shall be issued to adjust the unit price, if warranted.

39.8. Whenever a change in the Work is to be based on mutual acceptance of a lump sum, whether the amount is an addition, credit or no change-in-cost, Contractor shall submit an initial cost estimate acceptable to Consultant and Contract Administrator.

39.8.1. Such cost estimate shall include a breakdown listing the quantities and unit prices for materials, labor, equipment and other items of cost.

39.8.2. Whenever a change involves Contractor and one or more Subcontractors and the change is an increase in the Contract Price, overhead and profit percentage for Contractor and each Subcontractor shall be itemized separately.

39.9. Each Change Order must state within the body of the Change Order whether it is based upon unit price, negotiated lump sum, or "cost of the work."



ARTICLE 40. NOTIFICATION AND CLAIM FOR CHANGE OF CONTRACT TIME OR CONTRACT PRICE

40.1. Any claim for a change in the Contract Time or Contract Price shall be made by written notice by Contractor to the Contract Administrator and to Consultant within five (5) days of the commencement of the event giving rise to the claim or Contractor's knowledge of the claim, and the notice shall state the general nature and cause of the claim. Thereafter, within twenty (20) days after the termination of the event giving rise to the claim or Contractor's knowledge of the claim, Contractor shall submit written notice of the extent of the claim with supporting information and documentation to the Contract Administrator and Consultant (hereinafter "Claim Notice"). The Claim Notice shall include Contractor's written notarized certification that the adjustment claimed is the entire adjustment to which Contractor has reason to believe it is entitled as a result of the occurrence the event giving rise to the claim. If the Contract Administrator and Contractor cannot resolve a claim for changes in the Contract Time or Contract Price within twenty (20) days after receipt of the Claim Notice by the Contract Administrator and Consultant, then Contractor shall submit the claim to Consultant within five (5) days after the date of impasse in accordance with Article 12 hereof. **IT IS EXPRESSLY AND SPECIFICALLY AGREED THAT ANY AND ALL CLAIMS FOR CHANGES TO THE CONTRACT TIME OR CONTRACT PRICE SHALL BE WAIVED IF NOT SUBMITTED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.**

40.2. The Contract Time will be extended in an amount equal to time lost on critical Work items due to delays beyond the control of and through no fault or negligence of Contractor if a claim for an extension in accordance with Section 40.1. Such delays shall include, but not be limited to, acts, omissions, or neglect by any separate contractor employed by City, fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God.

ARTICLE 41. NO DAMAGES FOR DELAY

No claim for damages or any claim, other than for an extension of time, shall be made or asserted against City of Cooper City by reason of any delays except as provided herein. Contractor shall not be entitled to an increase in the Contract Price or payment or compensation of any kind from City of Cooper City for direct, indirect, consequential, impact or other costs, expenses or damages, including but not limited to costs of acceleration or inefficiency, arising from delay, disruption, interference or hindrance from any cause whatsoever, whether such delay, disruption, interference or hindrance be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable. Contractor shall be entitled only to extensions of the Contract Time as the sole and exclusive remedy for such resulting delay, in accordance with and to the extent specifically provided above; provided, however, that this provision shall not preclude recovery of damages by Contractor for actual delays due solely to fraud, bad faith, or active interference on the part of City of Cooper City or its Consultant.



ARTICLE 42. EXCUSABLE DELAY; COMPENSABLE; NON-COMPENSABLE

42.1. Excusable Delay. Delay that extends the completion of the Work and that is caused by circumstances beyond the control of Contractor or its Subcontractors, suppliers, or vendors are Excusable Delay. Contractor is entitled to a time extension of the Contract Time for each day the Work is delayed due to Excusable Delay. Contractor shall document its claim for any time extension as provided in Article 40 hereof. Failure of Contractor to comply with Article 40 hereof as to any particular event of delay shall be deemed conclusively to constitute a waiver, abandonment, or relinquishment of any and all claims resulting from that particular event of delay. Excusable Delay may be compensable or non-compensable, as provided below.

42.1.1. Compensable Excusable Delay. Excusable Delay is compensable when (i) the delay extends the Contract Time; (ii) is caused by circumstances beyond the control of Contractor or its Subcontractors, suppliers, or vendor; and (iii) is caused solely by fraud, bad faith or active interference on the part of City of Cooper City or its agents. In no event shall Contractor be compensated for interim delays that do not extend the Contract Time. Contractor shall be entitled to direct and indirect costs for Compensable Excusable Delay. Direct costs recoverable by Contractor shall be limited to the actual additional costs allowed pursuant to Article 39 hereof.

City of Cooper City and Contractor recognize and agree that the amount of Contractor's precise actual indirect costs for delay in the performance and completion of the Work is impossible to determine as of the date of execution of this Contract, and that proof of the precise amount will be difficult. Therefore, indirect costs recoverable by Contractor shall be liquidated on a daily basis for each day the Contract Time is delayed due to a Compensable Excusable Delay. These liquidated indirect costs shall be paid to compensate Contractor for all indirect costs caused by a Compensable Excusable Delay, and shall include, but not be limited to, lost profits, all profit on indirect costs, home office overhead, acceleration, loss of earnings, loss of productivity, loss of bonding capacity, loss of opportunity and all other indirect costs incurred by Contractor. The amount of liquidated indirect costs recoverable shall be Three Hundred Ninety-five Dollars \$395 per day for each day this Contract is delayed due to a Compensable Excusable Delay.

42.1.2. Non-Compensable Excusable Delay. When Excusable Delay is (i) caused by circumstances beyond the control of Contractor, its Subcontractors, suppliers, and vendors; (ii) caused by circumstances beyond the control of City of Cooper City or Consultant; or (iii) caused jointly or concurrently by Contractor or its Subcontractors, suppliers or vendors and by City of Cooper City or Consultant, then Contractor shall be entitled only to a time extension and no further compensation for the delay.



ARTICLE 43. SUBSTANTIAL COMPLETION

When Contractor determines in good faith that the Work, or a portion thereof designated by City of Cooper City pursuant to Article 30 hereof, has reached Substantial Completion, including any required training, Contractor shall so notify the Contract Administrator and Consultant in writing. Consultant and the Contract Administrator shall then promptly inspect the Work. When Consultant, on the basis of such an inspection, determines that the Work or designated portion thereof is substantially complete, it will then prepare a Certificate of Substantial Completion (Form 10). The Contract Administrator shall affix its determination to the Certificate of Substantial Completion, which shall establish the Date of Substantial Completion. The Certificate of Substantial Completion shall state the responsibilities of City of Cooper City and Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance. Consultant and the Contract Administrator shall develop and Contractor shall review the list of all Work yet to be completed by Contractor to satisfy the requirements of this Contract for Final Completion and to make the Work satisfactory and acceptable. The list shall be provided to Contractor within five (5) days after final development and review. If the final list is not provided within the stated five (5) days, the Contract Time for completion shall be extended by the number of days exceeding the five (5) days. The failure to include any items of corrective Work on such list does not alter the responsibility of Contractor to complete all Work in accordance with this Contract. Warranties required by this Contract shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Contract Administrator and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate of Substantial Completion.

ARTICLE 44. NO INTEREST

44.1. Unless prohibited by Applicable Law, City of Cooper City shall not be liable to pay any interest to Contractor for any reason, whether as prejudgment interest or for any other purpose, and Contractor waives, rejects, disclaims and surrenders any and all entitlement to interest in connection with a dispute or claim arising from, related to, or in connection with this Contract.

44.2. If the preceding section is inapplicable or is determined to be invalid or unenforceable by a court of competent jurisdiction, the annual rate of interest payable by City of Cooper City under this Contract, whether as prejudgment interest or for any other purpose, shall be, to the full extent permissible under Applicable Law, one quarter of one percent (0.25%) simple interest (uncompounded).

ARTICLE 45. SHOP DRAWINGS

45.1. Contractor shall submit Shop Drawings as required by the Technical Specifications. The purpose of the Shop Drawings is to show the suitability, efficiency, technique of manufacture,



installation requirements, details of the item, and evidence of its compliance or noncompliance with this Contract.

45.2. Within thirty (30) days after the Project Initiation Date specified in the Notice to Proceed, Contractor shall submit to Consultant a complete list of preliminary data on items for which Shop Drawings are to be submitted and shall identify the critical items. Approval of this list by Consultant shall in no way relieve Contractor from submitting complete Shop Drawings and providing all materials and equipment in accordance with this Contract. This procedure is required in order to expedite final approval of Shop Drawings.

45.3. After the approval of the list of items required in Section 45.2 above, Contractor shall promptly request Shop Drawings from the various manufacturers, fabricators, and suppliers.

45.4. Contractor shall thoroughly review and check the Shop Drawings, and shall approve each and every copy by initialing same, and shall transit a letter of approval to Consultant and City.

45.5. If the Shop Drawings show or indicate departures from the Contract requirements, Contractor shall specify such departures and make specific mention thereof in its letter of transmittal to Consultant and City. Failure to point out such departures shall not relieve Contractor from its responsibility to comply with this Contract.

45.6. Consultant shall review and approve Shop Drawings within twenty-one (21) days after the date received, unless said Shop Drawings are rejected by Consultant for material reasons. Consultant's approval of Shop Drawings will be general and shall not relieve Contractor of responsibility for the accuracy of such Shop Drawings, nor for the proper fitting and construction of the Work, nor for the furnishing of materials or Work required by this Contract but not indicated on the Shop Drawings. No Work called for by Shop Drawings shall be performed until the said Shop Drawings have been approved by Consultant. Approval by Consultant shall not relieve Contractor from responsibility for errors or omissions of any sort on the Shop Drawings.

45.7. No approval will be given to partial submittals of Shop Drawings for items that interconnect or are interdependent where necessary to properly evaluate the design. It is Contractor's responsibility to assemble the Shop Drawings for all such interconnecting or interdependent items, check such items, and then make one submittal to Consultant along with Contractor's comments as to compliance, noncompliance, or features requiring special attention.

45.8. If catalog sheets or prints of manufacturers' standard drawings are submitted as Shop Drawings, any additional information or changes on such drawings shall be typewritten or lettered in ink.



45.9. Contractor shall submit the number of copies of Shop Drawings required by Consultant. Resubmissions of Shop Drawings shall be made in the same quantity until final approval is obtained.

45.10. Contractor shall keep one set of Shop Drawings marked with Consultant's approval at the job site at all times.

ARTICLE 46. FIELD LAYOUT OF THE WORK AND RECORD DRAWINGS

46.1. The entire responsibility for establishing and maintaining line and grade in the field lies with Contractor. Contractor shall maintain an accurate and precise record of the location and elevation of all pipelines, conduits, structures, maintenance access structures, handholes, fittings and the like, and shall prepare record or "as-built" drawings of the same, which must be sealed by a Professional Surveyor. Contractor shall deliver these records in good order to Consultant as the Work is completed. The cost of all such field layout and recording work is included in the bid prices for the appropriate items. All record drawings shall be made on reproducible paper and shall be delivered to Consultant prior to, and as a condition of, final payment.

46.2. Contractor shall maintain in a safe place at the Project site one record copy of all Drawings, Plans, Specifications, Addenda, written amendments, Change Orders, Field Orders and written interpretations and clarifications in good order and annotated to show all changes made during construction. These record documents together with all approved samples and a counterpart of all approved Shop Drawings shall be available at all times to Consultant for reference. Upon Final Completion of the Project and prior to Final Payment, these record documents, samples, and Shop Drawings shall be delivered to the Contract Administrator.

46.3. Prior to, and as a condition precedent to Final Payment, Contractor shall submit to City of Cooper City Contractor's record drawings or as-built drawings acceptable to Consultant.

ARTICLE 47. SAFETY AND PROTECTION

47.1. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Project. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

- 47.1.1. All employees on the work site and other persons who may be affected thereby;
- 47.1.2. All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the Project site; and
- 47.1.3. Other property at the Project site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.



47.2. Contractor shall comply with all Applicable Law of any public body having jurisdiction for the safety of persons or property or to protect person or property from damage, injury, or loss, and Contractor shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and utilities when performance of the Work may affect them. All damage, injury, or loss to any property referred to in subsections 47.1.2 and 47.1.3 above, caused directly or indirectly, in whole or in part, by Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be repaired or remedied by Contractor. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and Consultant has issued a notice to City of Cooper City and Contractor that the Work is acceptable except as otherwise provided in Article 30.

47.3. Contractor shall designate a responsible member of its organization at the Project site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to City.

ARTICLE 48. FINAL BILL OF MATERIALS

Contractor shall be required to submit to City of Cooper City and Consultant a final bill of materials with unit costs for each bid item for supply of materials installed. This shall be an itemized list of all materials with a unit cost for each material, and the total cost shall be determined on the basis of the unit costs established for each Contract item. A Final Certificate for Payment will not be issued by Consultant until Contractor submits the final bill of materials and Consultant verifies the accuracy of the units of Work.

ARTICLE 49. PROJECT SIGN

Any requirements for a project sign shall be as set forth within the Technical Specifications section.

ARTICLE 50. CLEANING UP; CITY'S RIGHT TO CLEAN UP

Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by its operations. At the completion of the Project, Contractor shall remove all its waste materials and rubbish from and about the Project as well as its tools, construction equipment, machinery and surplus materials. If Contractor fails to clean up during the performance of the Work or at the completion of the Work, City of Cooper City may do so and the cost thereof shall be charged to Contractor. If a dispute arises between Contractor and separate contractors of City of Cooper City as to their responsibility for cleaning up, City of Cooper City may clean up and charge the cost thereof to the contractors responsible as Consultant shall determine to be appropriate and equitable.



ARTICLE 51. HURRICANE PRECAUTIONS

51.1. During such periods of time as are designated by the National Weather Services as being a hurricane watch or warning, Contractor, at no cost to City, shall take all precautions necessary to secure the Project site from any damage that may be caused by all threatened storm events, regardless of whether City of Cooper City or Consultant has given notice of same.

51.2. Compliance with any specific hurricane watch or warning precautions will not constitute additional work.

51.3. Suspension of the Work caused by a threatened or actual storm event, regardless of whether City of Cooper City has directed such suspension, will entitle Contractor to additional Contract Time as noncompensable, excusable delay, and shall not give rise to a claim for compensable delay.

ARTICLE 52. REMOVAL OF EQUIPMENT

In case of termination of this Contract before completion for any cause whatsoever, Contractor, if notified to do so by City of Cooper City, shall promptly remove any part or all of Contractor's equipment and supplies from the property of City of Cooper City, failing which City of Cooper City shall have the right to remove such equipment and supplies at the expense of Contractor.

ARTICLE 53. DOMESTIC PARTNERSHIP REQUIREMENT

[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT]

Unless this Contract is exempt from the provisions of the Broward County Domestic Partnership Act, Section 16½-157, of the Code ("Act"), Contractor certifies and represents that it will at all times comply with the provisions of the Act, and the contract language referenced in the Act is deemed incorporated in this Contract as though fully set forth in this section. The failure of Contractor to comply shall be a material breach of this Contract, entitling City of Cooper City to pursue any and all remedies provided under Applicable Law including, but not limited to (1) retaining all monies due or to become due Contractor until Contractor complies; (2) termination of this Contract; and (3) suspension or debarment of Contractor.

ARTICLE 54. EQUAL EMPLOYMENT OPPORTUNITY AND COUNTY BUSINESS ENTERPRISE / SMALL BUSINESS ENTERPRISE COMPLIANCE

[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT]

54.1. No party to this Contract may discriminate on the basis of race, color, sex, religion, national origin, disability, age, marital status, political affiliation, sexual orientation, pregnancy, or gender identity and expression in the performance of this Contract, except that any project assisted by the U.S. Department of Transportation funds shall comply with the



nondiscrimination requirements in 49 C.F.R. Parts 23 and 26. Contractor shall include the foregoing or similar language in its contracts with any Subcontractors.

54.2. By January 1 of each year, Contractor must submit, and cause each of its Subcontractors to submit, an Ownership Disclosure Form (or such other form or information designated by City), available at <https://www.broward.org/econdev/Pages/forms.aspx>, identifying the ownership of the entity and indicating whether the entity is majority-owned by persons fitting specified classifications.

[DELETE SECTIONS 54.3 – 54.10 IF FEDERALLY OR STATE FUNDED, SEE §§ 255.0991 AND 255.0992, FLA. STAT.]

54.3. Contractor shall comply with all applicable requirements in Section 1-81 of the Code, in the award and administration of this Contract. Failure by Contractor to carry out any of the requirements of this article shall constitute a material breach of this Contract, which shall permit City of Cooper City to terminate this Contract or exercise any other remedy provided under this Contract or Applicable Law, all such remedies being cumulative. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.4. Contractor must meet or exceed the required CBE or SBE goal by utilizing the CBE or SBE firms listed in Exhibit __ (or a CBE/SBE firm substituted for a listed firm, if permitted) for ___ percent (___%) of total Work under this Contract (the “Commitment”). In performing the Work, Contractor shall utilize the CBE or SBE firms listed in Exhibit __ for the scope of work and the percentage of work amounts identified on each Letter of Intent. Promptly upon execution of this Contract by City, Contractor shall enter into formal contracts with the CBE or SBE firms listed in Exhibit __ and, upon request, shall provide copies of the contracts to the Contract Administrator and OESBD. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

[USE FOLLOWING INSTEAD IF A CBE RESERVE PROJECT]

City of Cooper City has reserved this procurement solely for performance by CBE firms; therefore the CBE goal is one hundred percent (100%) of the Work under this Contract (the “Commitment”). Contractor is a CBE firm and agrees that it will meet the Commitment by Contractor performing the Work without subcontracting, or by Contractor performing at least fifty percent (50%) of the Work and subcontracting the remainder to CBE firms listed in Exhibit __ (or CBE firms substituted or approved by OESBD during the term of this Contract). **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

[USE FOLLOWING INSTEAD IF A SBE RESERVE PROJECT AND MODIFY REMAINDER OF ARTICLE 54 ACCORDINGLY]

City of Cooper City has reserved this procurement solely for performance by an SBE firm; therefore the SBE goal is one hundred percent (100%) of the Work under this Contract (the “Commitment”). Contractor is an SBE firm and agrees that it will meet the Commitment by Contractor performing the Work without subcontracting, or by Contractor performing at least fifty percent (50%) of the Work and subcontracting the remainder to SBE firms listed in Exhibit



____ (or SBE firms substituted or approved by OESBD during the term of this Contract). **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.5. Each CBE or SBE firm utilized by Contractor to meet the CBE or SBE goal must be certified by OESBD. Contractor shall inform City of Cooper City immediately when a CBE or SBE firm is not able to perform or if Contractor believes the CBE or SBE firm should be replaced for any other reason, so that OESBD can review and verify the good faith efforts of Contractor to substitute the CBE or SBE firm with another CBE or SBE firm. Whenever a CBE or SBE firm is terminated for any reason, Contractor shall provide written notice to OESBD and, upon written approval of the Director of OESBD, shall substitute another CBE or SBE firm in order to meet the CBE or SBE goal, unless otherwise provided in this Contract or agreed to in writing by the Parties. Such substitution shall not be required if the termination results from modification of the scope of services and no CBE or SBE firm is available to perform the modified scope of services; in which event, Contractor shall notify City, and OESBD may adjust the CBE or SBE goal by written notice to Contractor. Contractor shall not terminate a CBE or SBE firm for convenience without City's prior written consent, which consent shall not be unreasonably withheld. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.6. The Parties stipulate that if Contractor fails to meet the Commitment, the damages to City of Cooper City arising from such failure are not readily ascertainable at the time of contracting. If Contractor fails to meet the Commitment and City of Cooper City determines, in the sole discretion of the OESBD Program Director, that Contractor failed to make Good Faith Efforts (as defined in Section 1-81 of the Code) to meet the Commitment, Contractor shall pay City of Cooper City liquidated damages in an amount equal to fifty percent (50%) of the actual dollar amount by which Contractor failed to achieve the Commitment, up to a maximum amount of ten percent (10%) of the total contract amount excluding costs and reimbursable expenses. An example of this calculation is stated in Section 1-81.7 of the Code. As elected by City, such liquidated damages amount shall be either credited against any amounts due from City, or must be paid to City of Cooper City within thirty (30) days after written demand. These liquidated damages shall be City's sole contractual remedy for Contractor's breach of the Commitment, but shall not affect the availability of administrative remedies under Section 1-81. Contractor acknowledges and agrees that the liquidated damages provided in this section are proportionate to an amount that might reasonably be expected to flow from a breach of the Commitment and are not a penalty. Any failure to meet the Commitment attributable solely to force majeure, changes to the Scope of Work by City, or inability to substitute a CBE or SBE Subcontractor where the OESBD Program Director has determined that such inability is due to no fault of Contractor, shall not be deemed a failure by Contractor to meet the Commitment. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.7. Contractor acknowledges that the Board, acting through OESBD, may make minor administrative modifications to Section 1-81 of the Code, which shall become applicable to this Contract if the administrative modifications are not unreasonable. Written notice of any such modification shall be provided to Contractor and shall include a deadline for Contractor to notify City of Cooper City in writing if Contractor concludes that the modification exceeds the



authority under this section. Failure of Contractor to timely notify City of Cooper City of its conclusion that the modification exceeds such authority shall be deemed acceptance of the modification by Contractor. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.8. City of Cooper City may modify the Commitment in connection with any amendment, extension, modification, or change order to this Contract that, by itself or aggregated with previous amendments, extensions, modifications, or change orders, increases the initial Contract price by ten percent (10%) or more. Contractor shall make a good faith effort to include CBE or SBE firms in work resulting from any such amendment, extension, modification, or change order, and shall report such efforts, along with evidence thereof, to OESBD. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.9. Contractor shall provide written monthly reports to the Contract Administrator attesting to Contractor's compliance with the Commitment. In addition, Contractor shall allow City of Cooper City to engage in onsite reviews to monitor Contractor's progress in achieving and maintaining the Commitment. The Contract Administrator in conjunction with OESBD shall perform such review and monitoring, unless otherwise determined by the City of Cooper City Administrator. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

54.10. The Contract Administrator may withhold progress payments if Contractor fails to demonstrate timely payments of sums due to all Subcontractors and suppliers. The presence of a "pay when paid" provision in a Contractor's contract with a CBE or SBE firm shall not preclude City of Cooper City or its representatives from inquiring into claims of nonpayment. **[THIS ARTICLE IS NOT APPLICABLE TO THIS PROJECT].**

ARTICLE 55. PUBLIC RECORDS

Notwithstanding anything else in this Contract, any action taken by City of Cooper City in compliance with, or in a good faith attempt to comply with, the requirements of Chapter 119, Florida Statutes, shall not constitute a breach of this Contract. If Contractor is acting on behalf of City of Cooper City as provided in Section 119.0701, Florida Statutes, Contractor shall:

55.1. Keep and maintain public records required by City of Cooper City to perform the services under this Contract;

55.2. Upon request from City, provide City of Cooper City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time and at a cost that does not exceed that provided in Chapter 119, Florida Statutes, or as otherwise provided by Applicable Law;

55.3. Ensure that public records that are exempt or confidential and exempt from public record requirements are not disclosed except as authorized by Applicable Law for the duration of this Contract and after completion or termination of this Contract if the records are not transferred to City; and



55.4. Upon completion or termination of this Contract, transfer to City, at no cost, all public records in possession of Contractor or keep and maintain public records required by City of Cooper City to perform the services. If Contractor transfers the records to City, Contractor shall destroy any duplicate public records that are exempt or confidential and exempt. If Contractor keeps and maintains public records, Contractor shall meet all requirements of Applicable Law for retaining public records. All records stored electronically must be provided to City of Cooper City upon request in a format that is compatible with the information technology systems of City.

The failure of Contractor to comply with the provisions of this article shall constitute a material breach of this Contract entitling City of Cooper City to exercise any remedy provided in this Contract or under Applicable Law, all of such remedies being cumulative.

If Contractor receives a request for public records regarding this Contract or the Services, Contractor must immediately notify the Contract Administrator in writing and provide all requested records to City of Cooper City to enable City of Cooper City to timely respond to the public records request. City of Cooper City will respond to all such public records requests.

Contractor must separately submit and conspicuously label as “RESTRICTED MATERIAL – DO NOT PRODUCE” any material (a) that Contractor contends constitutes or contains its trade secrets under Chapter 688, Florida Statutes, or (b) for which Contractor asserts a right to withhold from public disclosure as confidential or otherwise exempt from production under Florida public records laws (including Chapter 119, Florida Statutes) (collectively, “Restricted Material”). In addition, Contractor must, simultaneous with the submission of any Restricted Material, provide a sworn affidavit from a person with personal knowledge attesting that the Restricted Material constitutes trade secrets or is otherwise exempt or confidential under Florida public records laws, including citing the applicable Florida statute and specifying the factual basis for each such claim. Upon request by City, Contractor must promptly identify the specific applicable statutory section that protects any particular document. If a third party submits a request to City of Cooper City for records designated by Contractor as Restricted Material, City of Cooper City shall refrain from disclosing such material unless otherwise ordered by a court of competent jurisdiction, authorized in writing by Contractor, or the claimed exemption is waived. Any failure by Contractor to strictly comply with the requirements of this section shall constitute Contractor’s waiver of City’s obligation to treat the records as Restricted Material. Contractor must indemnify and hold harmless City of Cooper City and its employees and agents from any and all claims, causes of action, losses, fines, penalties, damages, judgments, and liabilities of any kind, including attorneys’ fees, litigation expenses, and court costs, relating to nondisclosure of Restricted Material in response to a third-party request.

IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF FLORIDA STATUTES CHAPTER 119 TO CONTRACTOR’S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 954-433-4300, TAllen@CooperCity.gov, 9090 SW 50th Place, Cooper City, FL 33328. [END OF SECTION]



SECTION IV – SUPPLEMENTAL GENERAL CONDITIONS

[THIS IS ARPA RELATED SECTION]

The following deviations are incorporated herein and made a part of this Contract, revising the respective article and section as noted below.

Coding: Words in ~~striketrough~~ type are deletions from existing text. Words in underlined text are additions to existing text.

This project is funded through the American Rescue Plan Act (ARPA) of 2021. Consequently, the awarded vendor shall comply with requirements of ARPA agreement number Y5181 entered into by and between the State of Florida, Division of Emergency Management and the City of Cooper City. By entering into this Contract, the ARPA awardee agrees, at a minimum, to review and comply with the applicable requirements of 2 CFR Part 200 Subpart D. In case of any conflict between the City's Contract terms and conditions and ARPA provisions (presented as Supplemental General Conditions), the ARPA provisions shall prevail.

SGC-1 LAWS, RULES, REGULATIONS, AND POLICIES

Performance under this Agreement is subject to the applicable provisions of 2 CFR Part 200, Entitled "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards" including the cost principles and restrictions on general provisions for selected items of cost.

i. The following 2 CFR policy requirements also apply to this assistance listing:

- 2 CFR Part 200 – Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards
- 2 CFR Part 25 – Universal Identifier and System for Award Management
- 2 CFR Part 170 – Reporting Subaward and Executive Compensation Information
- 2 CFR Part 180 – OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)

ii. The following 2 CFR Policy requirements are excluded from coverage under this assistance listing:

- 2 CFR § 200.204 – Notices of Funding Opportunities
- 2 CFR § 200.205 – Federal awarding agency review of merit proposals
- 2 CFR § 200.210 – Preward costs



- 2 CFR § 200.213 – Reporting a determination that a non-Federal entity is not qualified for Federal award
- 2 CFR § 200.308 – Revision of budget and program plans
- 2 CFR § 200.309 – Modifications to Period of Performance
- 2 CFR § 200.305 (b) (8) – The non-Federal entity must maintain advance payments of Federal awards in interest-bearing accounts
- 2 CFR § 200.305 (b) (9) – Interest earned amounts up to \$500 per year

SGC-2 FEDERALLY FUNDED EQUAL OPPORTUNITY CLAUSE

- (1) Equal Employment Opportunity: During the performance of this contract, CONTRACTOR agrees to comply with 41 CFR 60-1.4(b), including, but not limited to, the following:
 - a. CONTRACTOR will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin.
 - b. CONTRACTOR will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
 - c. CONTRACTOR agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- (2) CONTRACTOR will, in all solicitations or advertisements for employees placed by or on behalf of CONTRACTOR, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- (3) CONTRACTOR will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with



CONTRACTOR's legal duty to furnish information.

- (4) CONTRACTOR will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of CONTRACTOR's commitments under section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (5) CONTRACTOR will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (6) CONTRACTOR will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to their books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (7) In the event of CONTRACTOR's non-compliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and CONTRACTOR may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (8) CONTRACTOR will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. CONTRACTOR will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event CONTRACTOR becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, CONTRACTOR may request the United States to enter into such litigation to protect the interests of the United States.

SGC-3 COPELAND "ANTI-KICKBACK" ACT

CONTRACTOR shall comply with the Copeland "Anti-Kickback" Act, (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or



Grants from the United States”) as may be applicable, which are incorporated by reference into this § 874; 40 U.S.C. § 3145; and 29 CFR part 3. CONTRACTOR must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which they are otherwise entitled. CITY must report all suspected or reported violations to the Federal awarding agency.

SGC-4 CONTRACT WORK HOURS AND SAFETY STANDARDS

Contract Work Hours and Safety Standards Act. (40 U.S.C. 3701- 3708). Where applicable, pursuant to 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5) CONTRACTOR must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchase of supplies or materials or articles ordinarily available on the open market, or contracts for transportation.

SGC-5 CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

Clean Air Act: Pursuant to 42 U.S.C. 7401- 7671q. and the Federal Water Pollution Control Act (33 U.S.C. 1251- 1387), as amended CONTRACTOR agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401- 7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251- 1387). CITY will report violations to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

1. Clean Air Act:) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
- (2) The contractor agrees to report each violation to CITY and understands and agrees that the CITY will, in turn, report each violation as required to assure notification to the State, Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
- (3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.
2. Federal Water Pollution Control Act:) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water



Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

- (2) The contractor agrees to report each violation to the CITY and understands and agrees that the CITY will, in turn, report each violation as required to assure notification to the State, Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
- (3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.”

SGC-6 SUSPENSION AND DEBARMENT

- (4) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such the contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- (2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
- (3) This certification is a material representation of fact relied upon by CITY. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to State and CITY, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- (4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

SGC-7 BYRD ANTI-LOBBYING AMENDMENT CLAUSE

Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended). Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes



place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient.

[END OF SECTION]

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SECTION V – SUPPLEMENTAL WAGE REQUIREMENTS

1. Prevailing Wage Rate Ordinance - This Project is not federally funded. If the price of this Contract is in excess of Two Hundred Fifty Thousand Dollars (\$250,000.00), the following sections shall apply. **[THIS SECTION IS NOT APPLICABLE TO THIS PROJECT].**

1.1. Contractor shall comply with the Davis-Bacon Act (40 U.S.C. 276a to 276a-7) as supplemented by Department of Labor Regulations (29 CFR Part 5).

1.2. The rate of wages and fringe benefit payments for all laborers, mechanics, and apprentices shall not be less than those payments for similar skills in classifications of work in a like construction industry as determined by the Secretary of Labor and as the most recently published in the Federal Register.

1.3. All mechanics, laborers, and apprentices, employed or working on the site of the Work, shall be paid in accordance with the above referenced wage rates. Contractor shall post this section of the Contract (Supplemental Wage Requirements) at the site of the Work in a prominent place where it can be easily seen by the workers.

1.4. If the Parties cannot agree on the proper classification of a particular class of laborers or mechanics or apprentices that will be used on the Work site, the Contract Administrator shall submit the question, together with its recommendation, to the City of Cooper City Administrator for final determination, which shall be binding.

1.5. If the Contract Administrator determines that any laborer or mechanic or apprentice employed by Contractor or any Subcontractor on the site of the Work has been or is being paid wages less than the rate of wages required by the Davis-Bacon Act, as amended, the Contract Administrator may (1) by written notice to Contractor direct Contractor to terminate the Work or such part of Work for which there has been a failure to pay said required wages; and (2) contract with another party perform the Work or portion thereof to completion. Whereupon, Contractor and its Sureties shall be liable to City of Cooper City for any all costs incurred by City of Cooper City to complete such Work to the extent such costs exceed any amounts that Contractor would be due for performance of such Work.

1.6. Contractor shall maintain payrolls and basic records relating thereto during the course of the Work and shall preserve such for a period of three (3) years thereafter for all laborers, mechanics, and apprentices working at the site of the Work. Such records shall contain the name and address of each such employee; the employee's current classification; rate of pay (including rates of contributions for, or costs assumed to provide, fringe benefits); daily and weekly number of hours worked; deductions made; and actual wages paid.

1.7. Contractor shall submit, with each application for payment, a signed and sworn "Statement of Compliance" (007500-8) attesting to compliance with the Prevailing Wage Ordinance, Section 26-5 of the Broward County of Ordinances, as amended.



1.8. The Contract Administrator may withhold or cause to be withheld from Contractor so much of the payments requisitioned as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and guards employed by Contractor or any Subcontractor on the Work, the full amount of wages required by this Contract.

1.9. If Contractor or any Subcontractor fails to pay any laborer, mechanic, or apprentice employed or working on the site of the Work all or part of the wages required by this Contract, the Contract Administrator may, after written notice to Contractor, take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased.

2. Federal Grant Projects:

2.1. Because this Project will be funded, in whole or in part, by the United States government all Federal assurances applicable to such funding, including any and all supervening assurances set forth in Rules and Regulations published in Federal Register or C.F.R., shall apply to this Contract.

2.2. Accordingly, all clauses, terms, or conditions required by federal grantor agency with respect to the federal funding for this Project are hereby attached and made a part of this Contract. City's American Rescue Plan Act (ARPA) Agreement, Number Y5181, Unique Identifier Code, FL 0061, with State of Florida Emergency, Division of Emergency Management, outlining aforementioned requirements are included as Attachment U of this Contract.

[END OF SECTION]



SECTION VI – SCOPE OF WORK/TECHNICAL SPECIFICATIONS

5.1 SCOPE OF WORK

The City of Cooper City Utilities Department is proposing to retain a qualified contractor to furnish and install a new 250-horsepower vertical turbine pump at the City's existing wastewater treatment plant effluent pump station. The proposed pump is replacing an existing 100-horsepower vertical turbine pump that was previously removed by the City. The contractor shall also furnish and install a variable frequency drive that will control the pump speed along with all associated miscellaneous work for a complete and operational system as described in the bid documents, technical specifications and project drawings.

This project is funded through the American Rescue Plan Act (ARPA) of 2021. Consequently, the awarded vendor shall comply with requirements of ARPA agreement number Y5181 entered into by and between the State of Florida, Division of Emergency Management and the City of Cooper City. In case of any conflict between the City's contract terms and conditions and ARPA provisions, the ARPA provisions shall prevail.

The objective of this ITB is to secure the services of a qualified, experienced, and reliable contractor that will promptly and efficiently provide the City with the materials, equipment, and services necessary to execute the work at the lowest price, in compliance with industry standards, federal, state and local requirements and the terms, conditions and specifications of this solicitation.

No compensation will accrue, be owed or paid to the awarded bidder unless the contract has been fully executed, Notice to Proceed provided, a purchase order has been issued with accompanying Task Order or Work Authorization and the work of the contract has been completed as accepted and approved by the City.

REFER TO THE ATTACHED, ADDITIONAL TECHNICAL SPECIFICATIONS AND PROJECT DRAWINGS

[END OF SECTION]



SECTION VII BID PROPOSAL

ATTACHMENT A BID FORM
(Page 1 of 7)

City of Cooper City, Florida

Bid Form

(7 pages)

Effluent Pump#3 Replacement

ITB 2023-05-UTL

Bids Due: Monday, November 13, 2023

For information, contact the Purchasing Division:

The Purchasing Division
954-433-4300 Ext. 268
Purchasing@CooperCity.gov

Release Date: Friday, October 13, 2023

Submitted by: _____
(Company name)

PLEASE RETURN ONLY THIS BID FORM (7 PAGES) AND THE REQUIRED ATTACHMENTS.



ATTACHMENT A
(Page 2 of 7)

Project: EFFLUENT PUMP #3 REPLACEMENT
(COOPER CITY WASTEWATER TREATMENT PLANT)

Contract Identification: ITB 2023-05-UTL

Bids submitted to: Office of the City Clerk
City of Cooper City
9090 SW 50th Place
Cooper City, Florida, 33328

1. The undersigned submitter/proposes and agrees, if this Bid is accepted, to enter into an agreement with City in the form included in the contract documents to perform and furnish all work as specified or indicated in the contract documents for the contract price and within the contract time indicated in this bid and in accordance with the other terms and conditions of the contract documents.
2. Bidder accepts all of the terms and conditions of the advertisement of Invitation to Bid and Instruction to Bidders including, without limitation, those dealing with the Bid requirements. This Bid will remain in full force for 120 days from bid opening date. Bidder will sign and submit an agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the City's Notice of Award.
3. If awarded the Contract, Bidder agrees to fully complete all necessary work within the time limits specified below after date of written Notice to Proceed, with such extensions of time as are provided for in the General Conditions

Substantial Completion: 335 calendar days from Notice to Proceed
Final Completion: 365 calendar days from Notice to Proceed

4. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement that:
 - a. Bidder has examined copies of all plans, and bidding documents, contract specifications and instruction to bidders.
 - b. Bidder has familiarized itself with the nature and extent of the Contract Documents, work site, locality, local conditions and the laws and regulations that in any manner may affect the cost, progress, performance or furnishing of the work.
 - c. Bidder has studied carefully all reports and drawings of the project and the physical conditions of the project site areas and accepts the extent of the technical data contained in such reports and drawings upon which Bidder is entitled to rely.



ATTACHMENT A
(Page 3 of 7)

- d. Bidder has correlated the results of their studies and reviews, observations, investigations, explorations, tests, and studies with the terms and conditions of the contract documents.
- e. Bidder has given City written notice of all conflicts, errors or discrepancies that is has discovered in these documents and the written resolution thereof by City is acceptable to Bidder.
- f. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporate and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false Bid, and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or the City.

5. Bid Copies:

ONE (1) ORIGINAL, TWO (2) COPIES and ONE (1) ELECTRONIC COPY (Flash Drive) of the Bid should be submitted to the City of Cooper City, City Hall, 9090 SW 50th Place, Cooper City, Florida 33328, to the attention of the Office of the City Clerk. If by US mail, Bids shall be submitted to 9090 SW 50th Place, Cooper City, Florida 33328.

6. Addenda, Additional Information-Contact with City Staff

Bidder acknowledges receipt of _____ (insert number) Addenda for this project

Any addenda or answers to written questions supplied by the City to participating Bidders become part of this Invitation to Bid and the resulting contract. The Bid Form shall be signed by an authorized company representative dated and returned with the proposal Bid.

No negotiations, decisions or actions shall be initiated or executed by the Bidder as result of any discussions with any City employee. Only those communications which are in writing from the City may be considered as a duly authorized expression. Also, only communications from bidder that are signed and in writing will be recognized by the City as duly authorized expressions on behalf of the bidder.

Specific questions related to the Scope of Services requested shall be directed in writing to the City of Cooper City Purchasing Division. Questions must be emailed to Purchasing@CooperCity.gov, who may respond in kind with copies to all Bidders. **The deadline for submission of questions is 5:00PM, Monday, October 16, 2023.**



ATTACHMENT A
(Page 4 of 7)

The successful bidder shall be required to execute a City contract covering the scope of services to be provided and setting forth the duties, rights and responsibilities of the parties.

This contract must be executed by the successful bidder prior to recommendation of award and presentation to the City Commission.

7. Summary of Documents to be submitted with Bid

Mark Complete	Attachment Letter	Attachment Name
	A	Bid Form
	B	List of Subcontractors/Suppliers
	C	Reference Form
	D	Public Entity Crimes (PEC) Form
	E	ADA Affidavit
	F	Business Entity Affidavit
	G	Bidder's Foreign (Non-Florida) Corporate Statement (If applicable)
	H	W-9, Request for Taxpayer Identification Number
	I	Proof of Workers Compensation Insurance or Exemption
	J	Proof of Liability Insurance
	K	Ownership Disclosure Affidavit
	L	Drug-Free Workplace Certificate
	M	Employee Background Verification Affidavit
	N	Scrutinized Companies Affidavit
	O	Non-Conflict of Interest Statement
	P	E-Verify Form
	Q	Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
	R	Bid Bond (5%)
	U	ARPA Agreement
	W	Prohibition Against Consideration of Social, Political or Ideological Interests Affidavit
	X	Compliance With Foreign Entity Laws Affidavit

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ATTACHMENT A

(Page 5 of 7)

Bidder's Contact Information

Name of Company: _____

Address: _____

Type of Business _____

Company's Website: _____

Authorized Signatory Contact: _____

Title: _____

Tel: _____ Mobile: _____

Email Address (Required): _____

Primary Contact: _____

Title: _____

Tel: _____ Mobile: _____

Email Address (Required): _____

Additional Contact & Title: _____

Tel: _____ Mobile: _____



Email Address (Required): _____

ATTACHMENT A
(Page 6 of 7)

Remit to Address: _____

Remit to Contact: Name: _____ Tel: _____

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ATTACHMENT A
 (Page 7 of 7)

**EFFLUENT PUMP #3 REPLACEMENT
 PRICING SHEET**

Item No.	Item Description	UOM	Quantity	Price Each	Extended Price
1	Mobilization/Demobilization (Shall not Exceed 8% of Contract Value)	Lump Sum	1	\$	\$
2	All work described in contract documents	Lump Sum	1	\$	\$
Grand Total					\$

Grand Total Price (in words): _____

Submitted by:

 (Print)

Authorized Signature:

 (Sign)

Company Name:

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____ <i>Name of person making statement</i>	
_____ <i>Signature of Notary Public - State of Florida</i>	
(NOTARY SEAL)	
_____ <i>Name of Notary Typed, Printed, or Stamped</i>	
Personally Known _____ OR Produced Identification _____	
Type of Identification Produced _____	



ATTACHMENT B LIST OF SUBCONTRACTORS/SUPPLIERS

Bidder shall list below information regarding subcontractors and suppliers who will perform work or labor or render service, or supply materials to the prime contractor in or about the construction of the Work or improvement, or subcontractors licensed by the State who, under subcontract to the prime contractor, specially fabricates and installs a portion of the Work or improvement according to the plans and specifications, in an amount in excess of two percent (2%) of the prime contractor’s Total Bid Price. Failure to comply with requirements may render the Bid non-responsive and may cause its rejection.

<u>Work to be Performed</u>	<u>Subcontractor License Number</u>	<u>Percent of Total Contract</u>	<u>Subcontractor’s Name & Address</u>

Note: Provide licenses, certifications, experience, and qualification forms for those subcontractors listed above. Include copies of the NF membrane manufacturer’s warranty and projections for 0, 1, 3 and 5 years at the system’s existing design parameters with the bid submission. Attach additional pages as needed.



ATTACHMENT C REFERENCE FORM
(Page 1 of 2)

All references shall be from entities/companies regularly engaged in the business of providing the goods and/or services as described in this solicitation. **CITY OF COOPER CITY STAFF SHALL NOT BE USED AS A CLIENT REFERENCE.**

1. ENTITY/COMPANY NAME: _____
ADDRESS: _____
CONTACT NAME: _____
CONTACT'S TITLE: _____
TELEPHONE: _____
E-MAIL (REQUIRED): _____
CONTRACT PERIOD: FROM: _____ TO: _____
DESCRIPTION & FACILITY SIZE: _____

2. ENTITY/COMPANY NAME: _____
ADDRESS: _____
CONTACT NAME: _____
CONTACT'S TITLE: _____
TELEPHONE: _____
E-MAIL (REQUIRED): _____
CONTRACT PERIOD: FROM: _____ TO: _____
DESCRIPTION & FACILITY SIZE: _____



ATTACHMENT C
(Page 2 of 2)

3. ENTITY/COMPANY NAME: _____

ADDRESS: _____

CONTACT NAME: _____

CONTACT'S TITLE: _____

TELEPHONE: _____

E-MAIL (REQUIRED): _____

CONTRACT PERIOD: FROM: _____ TO: _____

DESCRIPTION & FACILITY SIZE: _____

This page shall be completed IN FULL and submitted with your bid.



ATTACHMENT D PUBLIC ENTITY CRIMES (PEC) FORM
(Page 1 of 3)

**SWORN STATEMENT PURSUANT TO SECTION 287.133 (3) (a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES**

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A
NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to the CITY OF COOPER CITY, FLORIDA

by: _____
(print individual's name and title)

for: _____
(print name of entity submitting sworn statement)

whose business address is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is:
_____.

*(If the entity has no FEIN, include the Social Security Number of the individual signing this
sworn statement: _____ - _____ - _____).*

2. I understand that a “public entity crime” as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentations.

3. I understand that “convicted” or “conviction” as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an “affiliate” as defined in Paragraph 287.133(1)(a), Florida Statutes, means:



ATTACHMENT D

(Page 2 of 3)

- a) A predecessor or successor of a person convicted of a public entity crime; or
- b) An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term “affiliate” includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm’s length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a “person” as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term “person” includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement that I have marked below is true in relation to the entity submitting this sworn statement. (Indicate which statement applies).

Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, not any affiliate of the entity, has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

This entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public



interest to place the entity submitting this sworn statement on the convicted vendor list.
(attach a copy of the final order).

ATTACHMENT D
(Page 3 of 3)

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

Signature

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20 __, by: _____	
	<i>Name of person making statement</i>
(NOTARY SEAL)	_____ <i>Signature of Notary Public - State of Florida</i>
	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT E ADA AFFIDAVIT
(Page 1 of 2)

**AMERICANS WITH DISABILITIES ACT (ADA)
DISABILITY NONDISCRIMINATION STATEMENT**

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR
OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the CITY OF COOPER CITY, FLORIDA

by: _____
(print individual's name and title)

for: _____
(print name of entity submitting sworn statement)

whose business address is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is: _____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____ - _____ - _____.)

I, being duly first sworn state:

That the above named firm, corporation or organization is in compliance with and agreed to continue to comply with, and assure that any subcontractor, or third party contractor under this project complies with all applicable requirements of the laws listed below including, but not limited to, those provisions pertaining to employment, provision of programs and services, transportation, communications, access to facilities, renovations, and new construction.

The American with Disabilities Act of 1990 (ADA), Pub. L. 101-336, 104 Stat 327, 42 USC 1210112213 and 47 USC Sections 225 and 661 including Title I, Employment; Title II, Public Services; Title III, Public Accommodations and Services Operated by Private entities; Title IV, Telecommunications; and Title V, Miscellaneous Provisions.

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ATTACHMENT E
(Page 2 of 2)

The Florida Americans with Disabilities Accessibility Implementation Act of 1993, Section 553.501-553.513, Florida Statutes:

The Rehabilitation Act of 1973, 229 USC Section 794;
The Federal Transit Act, as amended 49 USC Section 1612;
The Fair Housing Act as amended 42 USC Section 3601-3631.

Signature

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
	<i>Name of person making statement</i>
	_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT F BUSINESS ENTITY AFFIDAVIT

I, _____, being first duly sworn state:

The full legal name and business address of the person(s) or entity proposing to contract or transact business with the City of Cooper City ("City") are (Post Office addresses are not acceptable), as follows:

Federal Employer Identification Number (FEIN) (If none, Social Security Number)

Name of Entity, Individual, Partners or Corporation

Doing Business As (If same as above, leave blank)

Street Address Suite City State

State and Date of Incorporation:

Signature of Affiant

Date

Print Name

STATE: FLORIDA
COUNTY: _____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____ <i>Name of person making statement</i>
_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)
_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____ OR Produced Identification _____
Type of Identification Produced _____



ATTACHMENT G FOREIGN (NON-FLORIDA) CORPORATE STATEMENT (IF APPLICABLE)
(Page 1 of 2)

FOREIGN (NON-FLORIDA) CORPORATION MUST COMPLETE THIS FORM
DEPARTMENT OF STATE CORPORATE CHARTER NO. _____

If your corporation is exempt from the requirements of Section 607.1501, Florida Statutes, YOU MUST CHECK BELOW the reason(s) for the exemption. Please contact the Department of State, Division of Corporations at (850) 245-6051 for assistance with corporate registration or exemptions. 607.1501 Authority of foreign corporation to transact business required.

- (1) A foreign corporation may not transact business in this state until it obtains a certificate of authority form the Department of State.
- (2) The following activities, among others, do not constitute transacting business within the meaning of subsection one (1):
 - _____ (a) Maintaining, defending, or settling any proceedings.
 - _____ (b) Holding meetings of the board of directors or shareholders or carrying on other activities concerning internal corporate affairs.
 - _____ (c) Maintaining bank accounts.
 - _____ (d) Maintaining officers of agencies for the transfer, exchange, and registration of the corporation's own securities or maintaining trustees or depositories with respect to those securities.
 - _____ (e) Selling through independent contractors.
 - _____ (f) Soliciting or obtaining orders, whether by mail or through employees, agents or otherwise, if the orders
 - _____ (g) Creating or acquiring indebtedness, mortgages, and security interests in real or personal property.
 - _____ (h) Securing or collecting debts or enforcing mortgages and security interests in property securing the debts.
 - _____ (i) Transacting business in interstate commerce.
 - _____ (j) Conducting an isolated transaction that is completed within 30 days and that is not one in the course of repeated transactions of a like nature.
 - _____ (k) Owning and controlling a subsidiary corporation incorporated in or transacting business within this state or voting the stock of any corporation which it has lawfully acquired.
 - _____ (l) Owning a limited partnership interest in a limited partnership that is doing business within this state, unless such limited partner manages or controls the partnership or exercises the powers and duties of a general partner.
 - _____ (m) Owning, without more, real or personal property.

The list of activities of subsection (2) is not exhaustive.

SPACE INTENTIONALLY LEFT BLANK
PROCEED TO NEXT PAGE



ATTACHMENT G
(Page 2 of 2)

- (3) This section has no application to the question of whether any foreign corporation is subject to service of process and suit in this state under any law of this state.

Please check one of the following if your firm in NOT a corporation:

- (I) _____ Partnership, Joint Venture, Estate or Trust
(II) _____ Sole Proprietorships of Self Employed

NOTE: This sheet MUST be enclosed with your bid if you claim an exemption or have checked I or II above, your firm will be considered a corporation and subject to all requirements listed herein.

SIGNATURE OF AUTHORIZED AGENT OF PROPOSER

BIDDER'S LEGAL NAME



ATTACHMENT H W-9, REQUEST FOR TAXPAYER IDENTIFICATION NUMBER

Form W-9 Request for Taxpayer Identification Number and Certification
Give Form to the requester. Do not send to the IRS.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
2 Business name/disregarded entity name, if different from above
3 Check appropriate box for federal tax classification; check only one of the following seven boxes:
4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
5 Address (number, street, and apt. or suite no.)
6 City, state, and ZIP code
7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)
Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see How to get a TIN on page 3.
Social security number
or
Employer identification number

Part II Certification
Under penalties of perjury, I certify that:
1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.
Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here
Signature of U.S. person
Click Here to Sign
Date

General Instructions
Section references are to the Internal Revenue Code unless otherwise noted.
Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.
Purpose of Form
An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:
• Form 1099-INT (interest earned or paid)
• Form 1099-DIV (dividends, including those from stocks or mutual funds)
• Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
• Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
• Form 1099-S (proceeds from real estate transactions)
• Form 1099-K (merchant card and third party network transactions)
• Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
• Form 1099-C (canceled debt)
• Form 1099-A (acquisition or abandonment of secured property)
Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.
If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.
By signing the filled-out form, you:
1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See What is FATCA reporting? on page 2 for further information.



ATTACHMENT I PROOF OF WORKERS COMPENSATION INSURANCE OR EXEMPTION

Dear Provider of Services or Goods:

In order to provide services or goods to City of Cooper City, we require that you provide us either proof of workers' compensation coverage or proof of exemption.

Workers' compensation insurance is required of all employers in Florida that employ 4 or more part or full time employees. In the event that you are an employer in the construction industry, you are required to have workers' compensation insurance if you employ one or more workers. Corporate officers and sole proprietors are included when calculating the number of employees. Note: Corporate officers may claim exemption from workers' compensation coverage on themselves only, by filing *Form DWC 250, Notice of Election to Be Exempt*. This form can be found at <https://www.floridawc.com/workers-comp-insurance/flwc/2011/04/exemptionform.pdf>

If you meet the above criteria to be exempt, you MUST provide us with one of the following:

- If your business is a sole proprietorship or unincorporated business: provide us a Verification of Automatic Exempt Certificate. This verification is a letter that is issued by the State of Florida Department of Financial Services. To receive a letter from the State, complete the following directions: 1) Call the National Council of Compensation Insurance 1-800-622-4123, Option 5, and ask them for the class code for your type of business. 2) Once you have received this code, call the Department of Financial Services at 1-850-413-1601 and provide them your business name, class code, mailing address, and contact phone number. They will send you the Verification of Automatic Exempt Certificate. 3) Provide us a copy of the Verification of Automatic Exempt Certificate.
- If your business is a corporation (including a professional association or limited liability company), and you are not required to have workers' compensation insurance as per the requirements as outlined above, you must complete the attached Workers' compensation Exemption Affidavit, have it notarized, and return the original to us.

If you are an employer that meets the requirements of workers' compensation and need to obtain coverage, contact your current business insurance agent, or you may use the following resources to locate an agent: www.faiacom.com, www.piafl.org, or call (850) 893-8245.

Please be reminded that the furnishing of this information to City of Cooper City is a non-negotiable requirement to perform services for us. Failure to provide this information in a timely manner may result in either termination of your services or delay of payment for services. Your workers' compensation Certificate of Coverage, Workers' Compensation Exemption Affidavit, or Verification of Automatic Exempt Certificate must be delivered or mailed to the Purchasing Division located at City Hall, 9090 SW 50th Place, Cooper City, Florida 33328, or emailed to Purchasing@CooperCity.gov



ATTACHMENT J PROOF OF LIABILITY INSURANCE

REQUEST FOR CERTIFICATE(S) OF INSURANCE

Dear Valued Vendor:

It is the City of Cooper City's policy to work only with properly insured companies. Please provide current Certificates of Insurance that include the following minimum coverages:

- Comprehensive General Liability Insurance - \$1,000,000 combined single limit of insurance per occurrence and \$2,000,000 in the general aggregate for Bodily Injury and Property Damage and \$3,000,000 general aggregate for Products/Completed Operations. Comprehensive General Liability insurance shall include endorsements for property damage, personal injury, contractual liability, completed operations, products liability and independent contractor's coverage.
- Workers' Compensation Insurance - Company shall provide coverage for its employees with statutory workers' compensation limits, and no less than \$500,000 for Employers' Liability. Said coverage shall include a blanket waiver of subrogation in favor of the City and its agents, employees and officials.
- Comprehensive Automobile Liability Insurance - Company shall provide coverage for all owned, non-owned and hired vehicles with limits of not less than \$1,000,000, per occurrence, Combined Single Limits (CSL) or its equivalent.
- Professional Liability (Errors & Omissions) – When applicable to Company's line of work, vendors of professional services shall provide coverage for all claims arising out of the services performed with limits not less than \$1,000,000 per claim. The aggregate limit shall either apply separately to this contract or shall be at least twice the required per claim limit. Company shall either require of its Subcontractors to procure and to maintain Subcontractor's Comprehensive General Insurance and Automobile Liability Insurance of the type and in the same amounts specified above or insure the activities of its Subcontractors in the Bidder's own policies.

No later than fifteen (15) days prior to the commencement of the project, Contractor, at its own expense, shall provide the City with a certificate of liability insurance and a copy of the additional insured endorsement naming the City of Cooper City its employees, directors, officers, agents, independent contractors, successors and assigns, and other authorized representatives as additional insured on a primary and non-contributory basis for all applicable policies. Additionally, the Contractor shall provide the City with a copy of the certificates of insurance and a copy of the additional insured endorsement reflecting the same insurance coverage for all subcontractors utilized by Contractor.

The City shall be granted a blanket Waiver of Subrogation on all applicable policies, and affirmed on the Certificate of Liability Insurance and the policy endorsement. The Contractor waives, and the Contractor shall ensure that the Contractor's insurance carrier waives, all subrogation rights against the City, its officials, employees, agents and volunteers for all losses or damages.

To ensure compliance, your insurance agent/company must provide your certificate(s) directly to the City. Certificates may be emailed to Purchasing@CooperCity.gov or mailed to City of Cooper City, Attn: Purchasing Division, 9090 SW 50th Place, Cooper City, FL 33328.

Thank you for your prompt attention to this request. If you have any questions, please email the Purchasing Division at Purchasing@CooperCityFL.org, or call 954-434-4300.



ATTACHMENT K OWNERSHIP DISCLOSURE AFFIDAVIT

- 1. If the contact or business transaction is with a corporation, the full legal name and business address shall be provided for each officer and director and each stockholder who holds directly or indirectly five percent (5%) or more of the corporation's stock. If the contract or business transaction is with a trust, the full legal name and address shall be provided for each trustee and each beneficiary. All such names and addresses are (Post Office addresses are not acceptable), as follows:

<u>Full Legal Name</u>	<u>Address</u>	<u>Ownership</u>
_____	_____	_____ %
_____	_____	_____ %
_____	_____	_____ %

- 2. The full legal names and business address of any other individual (other than subcontractors, materialmen, suppliers, laborers, or lenders) who have, or will have, any interest (legal, equitable, beneficial or otherwise) in the contract or business transaction with the City are (Post Office addresses are not acceptable), as follows:

Signature of Affiant

Print Name

Date

STATE: **FLORIDA**
COUNTY: _____

Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____
Name of person making statement

Signature of Notary Public - State of Florida

(NOTARY SEAL)

Name of Notary Typed, Printed, or Stamped

Personally Known _____ **OR** Produced Identification _____
Type of Identification Produced _____



ATTACHMENT L DRUG FREE WORKPLACE CERTIFICATE

I, the undersigned, in accordance with Florida Statute 287.087, hereby certify that, **(print or type name of firm)**

- Publishes a written statement notifying that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the workplace named above, and specifying actions that will be taken against violations of such prohibition.
- Informs employees about the dangers of drug abuse in the work place, the firm’s policy of maintaining a drug free working environment, and available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug use violations.
- Gives each employee engaged in providing commodities or contractual services that are under bid or proposal, a copy of the statement specified above.
- Notifies the employees that as a condition of working on the commodities or contractual services that are under bid or proposal, the employee will abide by the terms of the statement and will notify the employer of any conviction of, pleas of guilty or nolo contendere to, any violation of Chapter 1893, or of any controlled substance law of the State of Florida or the United States, for a violation occurring in the work place, no later than five (5) days after such conviction, and requires employees to sign copies of such written (*) statement to acknowledge their receipt.
- Imposes a sanction on, or requires the satisfactory participation in, a drug abuse assistance or rehabilitation program, if such is available in the employee’s community, by any employee who is so convicted.
- Makes a good faith effort to continue to maintain a drug free work place through the implementation of the drug free workplace program.

“As a person authorized to sign this statement, I certify that the above named business, firm or corporation complies fully with the requirements set forth herein”.

Signature of Affiant

Print Name

Date

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
<i>Name of person making statement</i>	
_____ <i>Signature of Notary Public - State of Florida</i>	
(NOTARY SEAL)	
_____ <i>Name of Notary Typed, Printed, or Stamped</i>	
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT M EMPLOYEE BACKGROUND VERIFICATION AFFIDAVIT

I, _____ of _____, attest that all personnel used
in
(Print Name) (Company Name)

the performance of this work have had a criminal background check with a passing grade;
and have been drug tested with a passing grade and are legally documented to work in the
United States.

Signature of Affiant

Print Name

Date

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
	<i>Name of person making statement</i>
	_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT N SCRUTINIZED COMPANIES AFFIDAVIT
(Page 1 of 2)

Certification pursuant to Florida Statute § 287.135 and § 215.473

I, _____, on behalf of,

Print Name and Title

Company Name

certify that _____ does not:

Company Name

1. Participate in a boycott of Israel; and
2. Is not on the Scrutinized Companies that Boycott Israel List; and
3. Is not on the Scrutinized Companies with Activities in Sudan List; and
4. Is not on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List; and
5. Has not engaged in business operations in Syria.

Submitting a false certification shall be deemed a material breach of contract. The City shall provide notice, in writing, to the Contractor of the City’s determination concerning the false certification. The Contractor shall have ninety (90) days following receipt of the notice to respond in writing and demonstrate that the determination of false certification was made in error. If the Contractor does not demonstrate that the City’s determination of false certification was made in error then the City shall have the right to terminate the contract and seek civil remedies pursuant to Florida Statute § 287.135.

Section 287.135, Florida Statutes, prohibits the City from: 1) Contracting with companies for goods or services in any amount if at the time of bidding on, submitting a proposal for, or entering into or renewing a contract if the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, F.S. or is engaged in a boycott of Israel; and

2) Contracting with companies, for goods or services over \$1,000,000.00 that are on either the Scrutinized Companies with activities in the Iran Petroleum Energy Sector List, created pursuant to s. 215.473, or are engaged in business operations in Syria.



ATTACHMENT N
(Page 2 of 2)

As the person authorized to sign on behalf of the Contractor, I hereby certify that the company identified above in the section entitled "Contractor Name" does not participate in any boycott of Israel, is not listed on the Scrutinized Companies that Boycott Israel List, is not listed on either the Scrutinized Companies with activities in the Iran Petroleum Energy Sector List, and is not engaged in business operations in Syria. I understand that pursuant to section 287.135, Florida Statutes, the submission of a false certification may subject the company to civil penalties, attorney's fees, and/or costs. I further understand that any contract with the City for goods or services may be terminated at the option of the City if the company is found to have submitted a false certification or has been placed on the Scrutinized Companies with Activities in Sudan list or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List.

COMPANY NAME

PRINT NAME

TITLE

SIGNATURE

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
	<i>Name of person making statement</i>
	_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT O
(Page 2 of 2)

By the signature(s) below, I/we, the undersigned, as authorized signatory to commit the firm, certify that the information as provided in this attachment is true and correct at the time of submission.

Signature of Affiant

Date

Printed Name & Title of Affiant

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
	<i>Name of person making statement</i>
(NOTARY SEAL)	_____ <i>Signature of Notary Public - State of Florida</i>
	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT P E-VERIFY FORM
(Page 1 of 3)

E-VERIFY FORM UNDER SECTION 448.095, FLORIDA STATUTES

TO BE RETURNED WITH PROPOSAL

Project Name:

Project No.:

1. Definitions:

“Contractor” means a person or entity that has entered or is attempting to enter into a contract with a public employer to provide labor, supplies, or services to such employer in exchange for salary, wages, or other remuneration. “Contractor” includes, but is not limited to, a vendor or consultant.

“Subcontractor” means a person or entity that provides labor, supplies, or services to or for a contractor or another subcontractor in exchange for salary, wages, or other remuneration.

“E-Verify system” means an Internet-based system operated by the United States Department of Homeland Security that allows participating employers to electronically verify the employment eligibility of newly hired employees.

2. Effective January 1, 2021, Contractors, shall register with and use the E-verify system in order to verify the work authorization status of all newly hired employees. Contractor shall register for and utilize the U.S. Department of Homeland Security’s E-Verify System to verify the employment eligibility of:

- a) All persons employed by a Contractor to perform employment duties within Florida during the term of the contract; and
- b) All persons (including sub vendors/subconsultants/subcontractors) assigned by Contractor to perform work pursuant to the contract with the City of Cooper City. The Contractor acknowledges and agrees that registration and use of the U.S. Department of Homeland Security’s E-Verify System during the term of the contract is a condition of the contract with the City of Cooper City; and



ATTACHMENT P
(Page 2 of 3)

- c) Should bidder become the successful Contractor awarded for the above-named project, by entering into the contract, the Contractor shall comply with the provisions of Section 448.095, Fla. Stat., "Employment Eligibility," as amended from time to time. This includes, but is not limited to registration and utilization of the E-Verify System to verify the work authorization status of all newly hired employees. Contractor shall also require all subcontractors to provide an affidavit attesting that the subcontractor does not employ, contract with, or subcontract with, an unauthorized alien. The Contractor shall maintain a copy of such affidavit for the duration of the contract.
3. Contract Termination
- a) If the City has a good faith belief that a person or entity with which it is contracting has knowingly violated s. 448.09 (1) Fla. Stat., the contract shall be terminated.
- b) If the City has a good faith belief that a subcontractor knowingly violated s. 448.095 (2), but the Contractor otherwise complied with s. 448.095 (2) Fla. Stat., shall promptly notify the Contractor and order the Contractor to immediately terminate the contract with the subcontractor.
- c) A contract terminated under subparagraph a) or b) is not a breach of contract and may not be considered as such.
- d) Any challenge to termination under this provision must be filed in the Circuit Court no later than 20 calendar days after the date of termination.
- e) If the contract is terminated for a violation of the statute by the Contractor, the Contractor may not be awarded a public contract for a period of 1 year after the date of termination.



ATTACHMENT P
(Page 3 of 3)

Company Name:
Authorized Signature:
Print Name:
Title
Date:
Phone:

STATE: **FLORIDA**
COUNTY: _____

Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20 __, by: _____
Name of person making statement

(NOTARY SEAL) _____
Signature of Notary Public - State of Florida

_____ *Name of Notary Typed, Printed, or Stamped*

Personally Known _____ **OR** Produced Identification _____
Type of Identification Produced _____



ATTACHMENT Q CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

SUBCONTRACTOR COVERED TRANSACTIONS

- (1) The prospective subcontractor, _____, of the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the Sub-Recipient’s subcontractor is unable to certify to the above statement, the prospective subcontractor shall attach an explanation to this form.

SUBCONTRACTOR

By: _____
Signature

Name and Title

Street Address

City, State, Zip

Date

City of Cooper City _____

Sub-Recipient’s Name

DEM Contract Number [N/A]

FEMA Project Number [N/A]



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

ATTACHMENT R BID BOND (5%)



ATTACHMENT S PRODUCT

[THIS ATTACHMENT IS NOT USED FOR THIS PROJECT]



ATTACHMENT T PRODUCT WARRANTY

[THIS ATTACHMENT IS NOT USED FOR THIS PROJECT]

[END OF SECTION]



ATTACHMENT U ARPA AGREEMENT

Agreement Number: Y5181
Unique Identifier Code: FL0061

AMERICAN RESCUE PLAN ACT CORONAVIRUS LOCAL FISCAL RECOVERY FUND AGREEMENT

This Agreement is entered into by and between the State of Florida, Division of Emergency Management (the "Division") and Cooper City, City of (the "Non-Entitlement Unit" or "Recipient").

RECITALS

- A. Section 9901 of the American Rescue Plan Act of 2021 (Pub. L. No. 117-2, §9901) added section 603(a) to the Social Security Act ("ARPA"), which created the Coronavirus Local Fiscal Recovery Fund for the purpose of providing funds to local governments in order to facilitate the ongoing recovery from the COVID-19 pandemic ("Fiscal Recovery Funds"); and
- B. Following the enactment of ARPA, the U.S. Department of the Treasury ("Treasury" or "Secretary") released formal and informal guidance regarding implementation of ARPA, including the disbursement and expenditure of Fiscal Recovery Funds, including Treasury Interim Final Rule, 31 CFR pt. 35, 2021, attending rule guidance published in the Federal Register, Volume 86, No 93,¹ and informal guidance made publicly available by Treasury, which may be amended, superseded, or replaced during the term of this Agreement ("Treasury Guidance"); and
- C. ARPA allocated **\$7,105,927,713.00** for making payments to metropolitan cities, non-entitlement units of local government, and counties in Florida, 21% of which is to be paid directly to metropolitan cities in Florida, 59% of which was paid directly to counties in Florida, and 20% of which is to be paid to the State of Florida for distribution to non-entitlement units of local government; and
- D. The Secretary disbursed **\$5,689,502,590.00** of these funds directly to metropolitan cities and counties; and
- E. A remaining balance of **\$1,416,425,123.00** was reserved for the State of Florida to disburse to non-entitlement units of local government; and
- F. The Division has received these funds from the Secretary through the State of Florida in accordance with the provisions of ARPA; and
- G. Pursuant to the provisions of ARPA, the Division is the state entity responsible for disbursing the funds to the Recipient under this Agreement; and
- H. The Recipient is fully qualified and eligible to receive this funding in accordance with ARPA for the purposes identified therein.

Therefore, in consideration of the mutual promises, terms and conditions contained herein, the Division and the Recipient agree as follows:

- (1) **RECITALS.** The foregoing recitals are true and correct and are incorporated herein by reference.
- (2) **TERM.** This Agreement shall be effective **upon execution** and shall end on **December 31, 2024**, unless terminated earlier in accordance with the provisions of this Agreement. Upon expiration or termination of this Agreement for any reason, the obligations which by their nature are intended to survive expiration or termination of this Agreement will survive.
- (3) **FUNDING.** The State of Florida, through the Division, will make a disbursement of each non-entitlement unit of local government's allocation based on the list of non-entitlement units published by Treasury and based upon the State's calculation of the Recipient's proportional share of the total population of all non-entitlement units in the State. The total Fiscal Recovery Funds allocation for Recipient under this Agreement is **\$17,930,560.00**.
- (4) **USE OF FISCAL RECOVERY FUNDS**
 - a. The State, through the Division, will—within 30 days of receiving payment from the Secretary, or within such other time period as may be permitted by the Secretary—make an initial disbursement to the non-entitlement

¹ <https://www.regulations.gov/document/TREAS-DO-2021-0008-0602> | Federal Register, Vol. 86, No. 93, Pg. 26786 ("Federal Register")

unit of local government of 50% of the total amount allocated to the non-entitlement unit.² Not earlier than 12 months from the date upon which the State makes the initial disbursement, the Secretary is expected to release the Second Tranche amount to the State. The State will—within 30 days of receiving payment from the Secretary, or within such other time period as may be permitted by the Secretary—make a second disbursement to the non-entitlement unit of local government.

- b. Recipients may use payments for any expenses eligible under ARPA Coronavirus State and Local Fiscal Recovery Funds. Payments are not required to be used as the source of funding of last resort.
- c. ARPA requires that Fiscal Recovery Funds may only be used to cover expenses incurred by the non-entitlement unit of local government by December 31, 2024³, such as:
 - i. to respond to the public health emergency with respect to COVID-19 or its negative economic impacts, including assistance to households, small businesses, and nonprofits, or aid to impacted industries such as tourism, travel, and hospitality;
 - ii. to respond to workers performing essential work during the COVID-19 public health emergency by providing premium pay to eligible workers of the non-entitlement unit of local government that are performing such essential work, or by providing grants to eligible employers that have eligible workers who perform essential work;
 - iii. for the provision of government services to the extent of the reduction in revenue of such non-entitlement unit of local government due to the COVID-19 public health emergency relative to revenues collected in the most recent full fiscal year of the non-entitlement unit of local government; or
 - iv. to make necessary investments in water, sewer, or broadband infrastructure.
- d. As specified in the Treasury Guidance, Eligible Use of Fiscal Recovery Funds falls under four categories, including (1) Public Health and Economic Impacts, (2) Premium Pay for Essential Workers, (3) Revenue Loss, and (4) Investments in Infrastructure.
 - i. Public Health and Economic Impacts: Examples of eligible uses of Fiscal Recovery Funds under this category include, but are not limited to:
 - 1. COVID-19 Mitigation and Prevention expenses, such as vaccination programs, medical care, testing, personal protective equipment (PPE), and ventilation improvements;⁴
 - 2. Medical expenses, including both current expenses and future medical services for individuals experiencing prolonged symptoms and health complications from COVID-19;⁵
 - 3. Payroll expenses for public safety, public health, health care, human services, and other similar employees, to the extent that their services are devoted to mitigating or responding to COVID-19;⁶
 - 4. Efforts to remedy the economic impact of the COVID-19 public health emergency on households, individuals, businesses, and state, local, and tribal governments;⁷ and
 - 5. Efforts to remedy pre-existing economic disparities which were exacerbated by the COVID-19 public health emergency.⁸
 - ii. Premium Pay: Fiscal Recovery Funds may also be used to provide premium pay to essential workers, per Treasury Guidance's definition of "essential work."⁹ Examples of essential workers include, but are not limited to:
 - 1. Staff at nursing homes, hospitals, and home care settings;
 - 2. Workers at farms, food production facilities, grocery stores, and restaurants;
 - 3. Janitors, truck drivers, transit staff, and warehouse workers
 - 4. Public health and safety staff;
 - 5. Childcare workers, educators, and other school staff; and

² "First Tranche Amount," American Rescue Plan Act of 2021, H.R. s. 601(b)(7) "Timing"

³ <https://home.treasury.gov/system/files/136/Coronavirus-Relief-Fund-Guidance-for-State-Territorial-Local-and-Tribal-Governments.pdf>

⁴ See Federal Register, pg. 26790.

⁵ *Id.*

⁶ *Id.* at 26791

⁷ *Id.* at 26791-26797

⁸ *Id.*

⁹ *Id.* at 26797

6. Social service and human services staff.¹⁰
- iii. Revenue Loss: Recipients may use Fiscal Recovery Funds for the provision of government services to the extent of the reduction in revenue experienced due to the COVID-19 Public Health Emergency.¹¹
- iv. Investments in Infrastructure: Treasury Guidance specifies that Fiscal Recovery Funds may be used to improve access to clean drinking water, improve wastewater and stormwater infrastructure systems, and provide access to high-quality broadband services.¹²
- e. Additional guidance regarding eligible uses of Fiscal Recovery Funds, as well as impermissible uses (including for pensions or to offset revenue losses from tax reductions) is set forth in Treasury Guidance.

(5) LAWS, RULES, REGULATIONS, AND POLICIES

- a. Performance under this Agreement is subject to the applicable provisions of 2 CFR Part 200, entitled "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards" including the cost principles and restrictions on general provisions for selected items of cost.
 - i. The following 2 CFR policy requirements apply to this assistance listing¹³:
 - Subpart B, General provisions;
 - Subpart C, Pre-Federal Award Requirements and Contents of Federal Awards;
 - Subpart D, Post Federal; Award Requirements;
 - Subpart E, Cost Principles; and
 - Subpart F, Audit Requirements.
 - ii. The following 2 CFR policy requirements also apply to this assistance listing: 2 C.F.R. Part 25, Universal Identifier and System for Award Management; 2 C.F.R. Part 170, Reporting Subaward and Executive Compensation Information; and 2 C.F.R. Part 180, OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Non-procurement). The following 2 CFR Policy requirements are excluded from coverage under this assistance listing: For 2 C.F.R. Part 200, Subpart C; 2 C.F.R. § 200.204 (Notices of Funding Opportunities); 2 C.F.R. § 200.205 (Federal awarding agency review of merit of proposal); 2 C.F.R. § 200.210 (Pre-award costs); and 2 C.F.R. § 200.213 (Reporting a determination that a non-Federal entity is not qualified for a Federal award). For 2 C.F.R. Part 200, Subpart D, the following provisions do not apply to the SLFRF program: 2 C.F.R. § 200.308 (revision of budget or program plan); 2 C.F.R. § 200.309 (modifications to period of performance); C.F.R. § 200.305 (b)(8) and (9) (Federal Payment).
- b. In addition to the foregoing, the Recipient and the Division will be governed by all applicable State and Federal laws, rules and regulations, including those identified in Attachment C. Any express reference in this Agreement to a particular statute, rule, or regulation in no way implies that no other statute, rule, or regulation applies.

(6) NOTICES

- a. All notices under this Agreement shall be made in writing to the individuals designated in this paragraph. In the event that different representatives or addresses are designated by either party after execution of this Agreement, notice of the new name, title and contact information of the new representative will be promptly provided to the other party, and no modification to this Agreement is required.
- b. In accordance with section 215.971(2), Florida Statutes, the Division's Program Manager will be responsible for enforcing performance of this Agreement's terms and conditions and will serve as the Division's liaison

¹⁰ *Id.*

¹¹ *Id.* at 26799

¹² *Id.* at 26802

¹³ As defined in 2 C.F.R. § 200.1



with the Recipient. As part of his/her duties, the Program Manager for the Division will monitor and document Recipient performance.

- c. The Division's Program Manager for this Agreement is:

Erin White
Division of Emergency Management
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100
Telephone: 850-815-4458
Email: Erin.White@em.myflorida.com

- d. The name and address of the representative responsible for the administration of this Agreement is:

Melissa Shirah
Division of Emergency Management
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100
Telephone: 850-815-4455
Email: Melissa.Shirah@em.myflorida.com

- e. The contact information of the representative of the Recipient is:

Authorized Representative: Joseph Napoli

Title: City Manager

Address: 9090 SW 50 Place, Cooper City, FL 33328

Telephone: 954-434-4300

Email: jnapoli@coopercityfl.org

(7) PAYMENT

- a. In order to obtain funding under this Agreement, the Recipient must file with the Division Program Manager information and documentation, including but not limited to the following:
- Local government name, Entity's Taxpayer Identification Number, DUNS number, and address;
 - Authorized representative name, title, and email;
 - Contact person name, title, phone, and email;
 - Financial institution information (e.g., routing and account number, financial institution name and contact information);
 - Total NEU budget (defined as the annual total operating budget, including general fund and other funds, in effect as of January 27, 2020) or top-line expenditure total (in exceptional cases in which the NEU does not adopt a formal budget);
 - Signed Assurances of Compliance with Title VI of the Civil Rights Act of 1964. (Attachment D); and
 - Signed Award Terms and Conditions Agreement (Attachment E).
- b. Payment requests must include a certification, signed by an official who is authorized to legally bind the Recipient, which reads as follows:

By signing this report, I certify to the best of my knowledge and belief that the report is true, complete, and accurate, and the expenditures, disbursements and cash receipts are for the purposes and objectives set forth in the terms and conditions of the Federal award. I am aware that any false, fictitious, or fraudulent information, or the omission of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (U.S. Code Title 18, Section 1001 and Title 31, Sections 3729-3730 and 3801-3812).

(8) RECORDS

- a. As a condition of receiving state or federal financial assistance, and as required by sections 20.055(6)(c) and 215.97(5)(b), Florida Statutes, the Division, the Chief Inspector General of the State of Florida, the Florida Auditor General, or any of their authorized representatives, shall enjoy the right of access to any documents, financial statements, papers, or other records of the Recipient which are pertinent to this Agreement, in order to make audits, examinations, excerpts, and transcripts. The right of access also includes timely and reasonable access to the Recipient's personnel for the purpose of interview and discussion related to such documents. For the purposes of this section, the term "Recipient" includes employees or agents, including all subcontractors or consultants to be paid from funds provided under this Agreement.
- b. The Recipient shall maintain all records related to this Agreement for the period of time specified in the appropriate retention schedule published by the Florida Department of State. Information regarding retention schedules can be obtained at: <http://dos.myflorida.com/library-archives/records-management/general-records-schedules/>.
- c. Florida's Government in the Sunshine Law (section 286.011, Florida Statutes) provides the citizens of Florida with a right of access to governmental proceedings and mandates three, basic requirements: (1) all meetings of public boards or commissions must be open to the public; (2) reasonable notice of such meetings must be given; and (3) minutes of the meetings must be taken and promptly recorded.
- d. Florida's Public Records Law provides a right of access to the records of the state and local governments as well as to private entities acting on their behalf. Unless specifically exempted from disclosure by Florida Statute, all materials made or received by a governmental agency (or a private entity acting on behalf of such an agency) in conjunction with official business which are used to perpetuate, communicate, or formalize knowledge qualify as public records subject to public inspection.

IF THE RECIPIENT HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE RECIPIENT'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT: (850) 815-4156, Records@em.myflorida.com, or 2555 Shumard Oak Boulevard, Tallahassee, FL 32399.

(9) AUDITS

- a. In accounting for the receipt and expenditure of funds under this Agreement, the Recipient must follow Generally Accepted Accounting Principles ("GAAP"). As defined by 2 CFR §200.49, "GAAP has the meaning specified in accounting standards issued by the Government Accounting Standards Board (GASB) and the Financial Accounting Standards Board (FASB).
- b. When conducting an audit of the Recipient's performance under this Agreement, the Division must use Generally Accepted Government Auditing Standards ("GAGAS"). As defined by 2 CFR §200.50, "GAGAS, also known as the Yellow Book, means generally accepted government auditing standards issued by the Comptroller General of the United States, which are applicable to financial audits.
- c. If an audit shows that all or any portion of the funds disbursed were not spent in accordance with the conditions of and strict compliance with this Agreement and with Section 603(c) of the Social Security Act, the Recipient will be held liable for reimbursement to the Secretary of all funds used in violation of these applicable regulations and Agreement provisions within thirty (30) days after the Division has notified the Recipient of such non-compliance.
- d. The Recipient must have all audits completed by an independent auditor, which is defined in section 215.97(2)(i), Florida Statutes, as "an independent certified public accountant licensed under chapter 473." The independent auditor must state that the audit complied with the applicable provisions noted above. The audits must be received by the Division no later than nine months from the end of the Recipient's fiscal year.
- e. The Recipient must send copies of reporting packages required under this paragraph directly to each of the following:

i.

The Division of Emergency Management
DEMSingle_Audit@em.myflorida.com



OR

Office of the Inspector General
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

ii.

The Auditor General
Room 401, Claude Pepper Building
111 West Madison Street
Tallahassee, Florida 32399-1450

- f. Fund payments are considered to be federal financial assistance subject to the Single Audit Act and the related provisions of the Uniform Guidance.

(10) REPORTS

- a. The Recipient must provide the Secretary with periodic reports providing a detailed accounting of the uses of such funds by such non-entitlement unit of local government including such other information as the Secretary may require for administration of the Coronavirus Local Fiscal Recovery Fund. Concurrently, Recipients must provide to the Division a copy of the report given to the Secretary.
- b. Failure by Recipient to submit all required reports and copies may result in the Division's withholding of further payments until all such documents are submitted to the Division and deemed to be satisfactory.
- c. The Recipient must provide additional program updates or information if requested by the Division.

(11) LIABILITY

Any Recipient which is a state agency or subdivision, as defined in section 768.28, Florida Statutes, agrees to be fully responsible for its negligent or tortious acts or omissions which result in claims or suits against the Division, and agrees to be liable for any damages proximately caused by the acts or omissions to the extent set forth in section 768.28, Florida Statutes. Nothing herein is intended to serve as a waiver of sovereign immunity by any party to which sovereign immunity applies. Nothing herein will be construed as consent by a state agency or subdivision of the State of Florida to be sued by third parties in any matter arising out of this Agreement.

(12) TERMINATION

- a. The Division may terminate this Agreement immediately for cause upon written notice to Recipient. Cause includes, but is not limited to, misuse of funds, fraud, non-compliance with ARPA, Treasury Guidance, or other applicable rules, laws and regulations, or failure by the Recipient to afford timely public access to any document, paper, letter, or other material subject to disclosure under Chapter 119, Florida Statutes.
- b. The Division may terminate this Agreement for convenience upon thirty (30) days' prior written notice to Recipient.
- c. In the event this Agreement is terminated, the Recipient must not incur new obligations for the terminated portion of this Agreement after it has received the notification of termination. The Recipient must cancel as many outstanding obligations as possible. Obligations incurred after receipt of the termination notice will be disallowed. The Recipient will not be relieved of liability to the Division because of any breach of this Agreement by the Recipient. The Division may, if and to the extent permitted by ARPA and Treasury Guidance, withhold payments to the Recipient for the purpose of set-off until the exact amount due the Division from the Recipient is determined and resolved.

(13) MISCELLANEOUS

- a. The validity of this Agreement is subject to the truth and accuracy of all the information, representations, and materials submitted or provided by the Recipient in this Agreement, in any later submission or response to a Division request, or in any submission or response to fulfill the requirements of this Agreement. All of said information, representations, and materials is incorporated by reference. The inaccuracy of the submissions



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- or any material changes will, at the option of the Division and with thirty (30) days written notice to the Recipient, cause the termination of this Agreement and the release of the Division from all its obligations to the Recipient.
- b. This Agreement must be construed under the laws of the State of Florida, and venue for any actions arising out of this Agreement will be in the Circuit Court of Leon County. If any provision of this Agreement is in conflict with any applicable statute or rule, or is unenforceable, then the provision is null and void to the extent of the conflict, and is severable, but does not invalidate any other provision of this Agreement.
 - c. Any power of approval or disapproval granted to the Division under the terms of this Agreement will survive the term of this Agreement.
 - d. This Agreement may be executed in any number of counterparts, any one of which may be taken as an original.
 - e. The Recipient agrees to comply with the Americans With Disabilities Act (Public Law 101-336, 42 U.S.C. Section 12101 et seq.), which prohibits discrimination by public and private entities on the basis of disability in employment, public accommodations, transportation, State and local government services, and telecommunications.
 - f. The Recipient must comply with any Statement of Assurances incorporated as Attachment D.
 - g. Those who have been placed on the convicted vendor list following a conviction for a public entity crime or on the discriminatory vendor list may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with a public entity, and may not transact business with any public entity in excess of \$25,000.00 for a period of thirty-six (36) months from the date of being placed on the convicted vendor list or on the discriminatory vendor list.
 - h. The State of Florida's performance and obligation to pay under this Agreement is contingent upon an annual appropriation by the Legislature, and subject to any modification in accordance with Chapter 216, Florida Statutes, or the Florida Constitution.
 - i. All bills for fees or other compensation for services or expenses shall be submitted in detail sufficient for a proper pre-audit and post-audit thereof.
 - j. Any bills for travel expenses must be submitted in accordance with section 112.061, Florida Statutes.
 - k. This Agreement, upon execution, contains the entire agreement of the parties and no prior written or oral agreement, express or implied, shall be admissible to contradict the provisions of this Agreement.
 - l. This Agreement may not be modified except by formal written amendment executed by both of the parties.
 - m. If the Recipient is allowed to temporarily invest any advances of funds under this Agreement, they must use the interest earned or other proceeds of these investments only to cover expenditures incurred in accordance with section 603 of the Social Security Act and the Guidance on eligible expenses. If a government deposits Fiscal Recovery Fund payments in a government's general account, it may use those funds to meet immediate cash management needs provided that the full amount of the payment is used to cover necessary expenditures. Fund payments are not subject to the Cash Management Improvement Act of 1990, as amended. The State of Florida will not intentionally award publicly-funded contracts to any contractor who knowingly employs unauthorized alien workers, constituting a violation of the employment provisions contained in 8 U.S.C. Section 1324a(e) [Section 274A(e) of the Immigration and Nationality Act ("INA")]. The Division shall consider the employment by any contractor of unauthorized aliens a violation of Section 274A(e) of the INA. Such violation by the Recipient of the employment provisions contained in Section 274A(e) of the INA will be grounds for unilateral cancellation of this Agreement by the Division.
 - n. The Recipient is subject to Florida's Government in the Sunshine Law (section 286.011, Florida Statutes) with respect to the meetings of the Recipient's governing board or the meetings of any subcommittee making recommendations to the governing board. All of these meetings must be publicly noticed, open to the public, and the minutes of all the meetings will be public records, available to the public in accordance with Chapter 119, Florida Statutes.
 - o. All expenditures of state or federal financial assistance must be in compliance with the laws, rules and regulations applicable to expenditures of State funds, including but not limited to, the Reference Guide for State Expenditures.
 - p. In accordance with section 215.971(1)(d), Florida Statutes, the Recipient may expend funds authorized by this Agreement only for allowable costs resulting from obligations incurred during the specific agreement period.



- q. Any balances of unobligated cash that have been advanced or paid that are not authorized to be retained for direct program costs in a subsequent period must be refunded to the Secretary.
- r. If the purchase of the asset was consistent with the limitations on the eligible use of Fiscal Recovery Funds provided by ARPA and Treasury Guidance, the Recipient may retain the asset. If such assets are disposed of prior to December 31, 2024, the proceeds would be subject to the restrictions on the eligible use of Fiscal Recovery Funds provided by ARPA.

(14) LOBBYING PROHIBITION

- a. 2 CFR §200.450 prohibits reimbursement for costs associated with certain lobbying activities.
- b. Section 216.347, Florida Statutes, prohibits "any disbursement of grants and aids appropriations pursuant to a contract or grant to any person or organization unless the terms of the grant or contract prohibit the expenditure of funds for the purpose of lobbying the Legislature, the judicial branch, or a state agency."
- c. No funds or other resources received from the Division under this Agreement may be used directly or indirectly to influence legislation or any other official action by the Florida Legislature or any state agency.
- d. The Recipient certifies the following:
 - i. No Federal appropriated funds have been paid or will be paid, by or on behalf of the Recipient, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.
 - ii. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan or cooperative agreement, the Recipient must complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities."
 - iii. The Recipient must require that this certification be included in the award documents for all subawards (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all Recipients shall certify and disclose.
 - iv. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(15) REQUIRED CONTRACTUAL PROVISIONS

a. EQUAL OPPORTUNITY EMPLOYMENT

- i. In accordance with 41 CFR §60-1.4(b), the Recipient hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the contractor agrees as follows:

- 1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

- a. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
6. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this Agreement or with any of the said rules, regulations, or orders, this Agreement may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
8. The contractor will include the portion of the sentence immediately preceding paragraph 1(a)(ii) of this section and the provisions of subparagraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

b. COPELAND ANTI-KICKBACK ACT

- i. The Recipient hereby agrees that, unless exempt under Federal law, it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, the following clause:



"Contractor. The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 CFR pt. 3 as may be applicable, which are incorporated by reference into this contract."

- ii. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause in subsection b(i) above and such other clauses as the Secretary may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
- iii. Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 CFR § 5.12.

c. CONTRACT WORK HOURS AND SAFETY STANDARDS

If the Recipient, with the funds authorized by this Agreement, enters into a contract that exceeds \$100,000 and involves the employment of mechanics or laborers, then any such contract must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation.

d. CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT

If the Recipient, with the funds authorized by this Agreement, enters into a contract that exceeds \$150,000, then any such contract must include the following provision:

"Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387), and will report violations to FEMA and the Regional Office of the Environmental Protection Agency (EPA)."

e. SUSPENSION AND DEBARMENT

If the Recipient, with the funds authorized by this Agreement, enters into a contract, then any such contract must include the following provisions:

- i. This contract is a covered transaction for purposes of 2 CFR pt. 180 and 2 CFR pt. 3000. As such the contractor is required to verify that neither the contractor, its principals (defined at 2 CFR § 180.995), nor its affiliates (defined at 2 CFR § 180.905) are excluded (defined at 2 CFR § 180.940) or disqualified (defined at 2 CFR § 180.935).
- ii. The contractor must comply with 2 CFR pt. 180, subpart C and 2 CFR pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction into which it enters.
- iii. This certification is a material representation of fact relied upon by the Division. If it is later determined that the contractor did not comply with 2 CFR pt. 180, subpart C and 2 CFR pt. 3000, subpart C, in addition to remedies available to the Division, the Federal Government may pursue available remedies, including, but not limited to, suspension and/or debarment.
- iv. The bidder or proposer agrees to comply with the requirements of 2 CFR pt. 180, subpart C and 2 CFR pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.



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f. BYRD ANTI-LOBBYING AMENDMENT

If the Recipient enters into a contract using funds authorized by this Agreement, then any such contract must include the following clause:

"Byrd Anti-Lobbying Amendment, 31 USC § 1352 (as amended). Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Recipient."

(16) ATTACHMENTS. The parties agree to, and incorporate as though set forth fully herein, the following exhibits and attachments:

- Exhibit 1 Funding Sources
- Attachment A ARPA Coronavirus Local Fiscal Recovery Fund Eligibility Certification
- Attachment B Certification Regarding Lobbying
- Attachment C Program Statutes and Regulations
- Attachment D Statement of Assurances
- Attachment E Award Terms and Conditions

(17) LEGAL AUTHORIZATION. The Recipient certifies that its governing body has authorized the Recipient's execution of this Agreement and that the undersigned person has the authority to legally execute and bind the Recipient to the terms of this Agreement.

RECIPIENT
Cooper City, City of

By:

Name and title: *Craig Ross, Mayor*
Date: *August 24, 2024*
FEIN : 598022407
DUNS : 024478224

STATE OF FLORIDA
DIVISION OF EMERGENCY MANAGEMENT

By: Melissa Shirah Digitally signed by Melissa Shirah
Date: 2021.09.13 16:20:43 -0400'
Name and Title: Kevin Guthrie, Director
Date: _____



Exhibit 1

Funding Sources

STATE RESOURCES AWARDED TO THE RECIPIENT PURSUANT TO THIS AGREEMENT, SUBJECT TO SECTION 215.97, FLORIDA STATUTES, CONSIST OF THE FOLLOWING:

State Project -

State awarding agency: Florida Division of Emergency Management

Catalog of State Financial Assistance title: Coronavirus State and Local Fiscal Recovery Funds (CSFRF)

Catalog of Federal Domestic Assistance number: 21.027

Amount of State Funding: \$17,930,560.00



Attachment A

ARPA Coronavirus Local Fiscal Recovery Fund Eligibility Certification

I, Greg Ross, am the Authorized Agent of Cooper City, City of ("Recipient") and I certify that:

1. I have the authority on behalf of the Recipient to request fund payments from the State of Florida ("State") for federal funds appropriated pursuant to section 603 of the Social Security Act, as added by section 9901 of the American Rescue Plan Act, Pub. L. No. 117-2, Title VI (March 11, 2021).
2. I have submitted to the State the Recipient's Total Budget in effect as of January 27, 2020, as defined by the United States Department of the Treasury, the annual operating budget including general fund and other funds.
3. I understand that the State will rely on this certification as a material representation in making grant payments to the Recipient.
4. I acknowledge that the Recipient should keep records sufficient to demonstrate that the expenditure of funds it has received is in accordance with section 603(a) of the Social Security Act.
5. I acknowledge that all records and expenditures are subject to audit by the United States Department of Treasury's Inspector General, the Florida Division of Emergency Management, and the Florida State Auditor General, or designee.
6. I acknowledge that the Recipient has an affirmative obligation to identify and report any duplication of benefits. I understand that the State has an obligation and the authority to de-obligate or offset any duplicated benefits.
7. I acknowledge and agree that the Recipient shall be liable for any costs disallowed pursuant to financial or compliance audits of funds received.
8. I acknowledge that if the Recipient has not obligated the funds it has received to cover costs that were incurred by December 31, 2024, as required by the statute, those funds must be returned to the United States Department of the Treasury.
9. I acknowledge that the Recipient's proposed uses of the funds provided as grant payments from the State by federal appropriation under section 603 of the Social Security Act will be used only to cover those costs that:
 - a. to respond to the public health emergency with respect to the Coronavirus Disease 2019 (COVID-19) or its negative economic impacts, including assistance to households, small businesses, and nonprofits, or aid to impacted industries such as tourism, travel, and hospitality;
 - b. to respond to workers performing essential work during the COVID-19 public health emergency by providing premium pay to eligible workers of the metropolitan city, non-entitlement unit of local government, or county that are performing such essential work, or by providing grants to eligible employers that have eligible workers who perform essential work;
 - c. for the provision of government services to the extent of the reduction in revenue of such metropolitan city, non-entitlement unit of local government, or county due to the COVID-19 public health emergency relative to revenues collected in the most recent full fiscal year of the metropolitan city, non-entitlement unit of local government, or county prior to the emergency; or
 - d. to make necessary investments in water, sewer, or broadband infrastructure.

In addition to each of the statements above, I acknowledge on submission of this certification that my jurisdiction has incurred eligible expenses during the period that begins on March 3, 2021 and ends on December 31, 2024.

By: Greg Ross
 Signature: [Handwritten Signature]
 Title: Mayor
 Date: August 24, 2021



Attachment B
Certification Regarding Lobbying

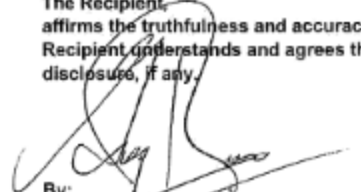
Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned Recipient, Greg Ross, certifies, to the best of his or her knowledge that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence any officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all Recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. Sec. 1352 (as amended by the Lobbying Disclosure Act of 119). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Recipient, Greg Ross, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, Recipient understands and agrees that the provisions of 31 U.S.C. Sec. 3801 et seq. apply to his certification and disclosure, if any.

By: 
 Signature:
 Title: Mayor
 Date: 1 August 24, 2021



Attachment C

Program Statutes and Regulations

42 U.S.C. 801 Social Security Act
Title 31, Part 35, Code of Federal
Regulations
Section 215.422, Florida Statutes

Section 215.971, Florida Statutes
Section 216.347, Florida Statutes
CFO MEMORANDUM NO. 04 (2005-06)

Coronavirus State and Local Fiscal Recovery Funds
Treasury Interim Final Rule

Payments, warrants, and invoices; processing time limits; dispute limitation; agency
or judicial branch compliance

Agreements funded with federal and state assistance

Disbursement of grant and aids appropriations for lobbying prohibited

Compliance Requirements for Agreements



OMB Approved No. 1505-0271
Expiration Date: November 30, 2021

ASSURANCES OF COMPLIANCE WITH CIVIL RIGHTS REQUIREMENTS

ASSURANCES OF COMPLIANCE WITH TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

As a condition of receipt of federal financial assistance from the Department of the Treasury, the recipient named below (hereinafter referred to as the "Recipient") provides the assurances stated herein. The federal financial assistance may include federal grants, loans and contracts to provide assistance to the Recipient's beneficiaries, the use or rent of Federal land or property at below market value, Federal training, a loan of Federal personnel, subsidies, and other arrangements with the intention of providing assistance. Federal financial assistance does not encompass contracts of guarantee or insurance, regulated programs, licenses, procurement contracts by the Federal government at market value, or programs that provide direct benefits.

The assurances apply to all federal financial assistance from or funds made available through the Department of the Treasury, including any assistance that the Recipient may request in the future.

The Civil Rights Restoration Act of 1987 provides that the provisions of the assurances apply to all of the operations of the Recipient's program(s) and activity(ies), so long as any portion of the Recipient's program(s) or activity(ies) is federally assisted in the manner prescribed above.

1. Recipient ensures its current and future compliance with Title VI of the Civil Rights Act of 1964, as amended, which prohibits exclusion from participation, denial of the benefits of, or subjection to discrimination under programs and activities receiving federal financial assistance, of any person in the United States on the ground of race, color, or national origin (42 U.S.C. § 2000d *et seq.*), as implemented by the Department of the Treasury Title VI regulations at 31 CFR Part 22 and other pertinent executive orders such as Executive Order 13166, directives, circulars, policies, memoranda, and/or guidance documents.
2. Recipient acknowledges that Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," seeks to improve access to federally assisted programs and activities for individuals who, because of national origin, have Limited English proficiency (LEP). Recipient understands that denying a person access to its programs, services, and activities because of LEP is a form of national origin discrimination prohibited under Title VI of the Civil Rights Act of 1964 and the Department of the Treasury's implementing regulations. Accordingly, Recipient shall initiate reasonable steps, or comply with the Department of the Treasury's directives, to ensure that LEP persons have meaningful access to its programs, services, and activities. Recipient understands and agrees that meaningful access may entail providing language assistance services, including oral interpretation and written translation where necessary, to ensure effective communication in the Recipient's programs, services, and activities.
3. Recipient agrees to consider the need for language services for LEP persons when Recipient develops applicable budgets and conducts programs, services, and activities. As a resource, the Department of the Treasury has published its LEP guidance at 70 FR 6067. For more information on taking reasonable steps to provide meaningful access for LEP persons, please visit <http://www.lep.gov>.

4. Recipient acknowledges and agrees that compliance with the assurances constitutes a condition of continued receipt of federal financial assistance and is binding upon Recipient and Recipient's successors, transferees, and assignees for the period in which such assistance is provided.
5. Recipient acknowledges and agrees that it must require any sub-grantees, contractors, subcontractors, successors, transferees, and assignees to comply with assurances 1-4 above, and agrees to incorporate the following language in every contract or agreement subject to Title VI and its regulations between the Recipient and the Recipient's sub-grantees, contractors, subcontractors, successors, transferees, and assignees:

The sub-grantee, contractor, subcontractor, successor, transferee, and assignee shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with "Limited English Proficiency" in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, and herein incorporated by reference and made a part of this contract or agreement.

6. Recipient understands and agrees that if any real property or structure is provided or improved with the aid of federal financial assistance by the Department of the Treasury, this assurance obligates the Recipient, or in the case of a subsequent transfer, the transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is provided, this assurance obligates the Recipient for the period during which it retains ownership or possession of the property.
7. Recipient shall cooperate in any enforcement or compliance review activities by the Department of the Treasury of the aforementioned obligations. Enforcement may include investigation, arbitration, mediation, litigation, and monitoring of any settlement agreements that may result from these actions. The Recipient shall comply with information requests, on-site compliance reviews and reporting requirements.
8. Recipient shall maintain a complaint log and inform the Department of the Treasury of any complaints of discrimination on the grounds of race, color, or national origin, and limited English proficiency covered by Title VI of the Civil Rights Act of 1964 and implementing regulations and provide, upon request, a list of all such reviews or proceedings based on the complaint, pending or completed, including outcome. Recipient also must inform the Department of the Treasury if Recipient has received no complaints under Title VI.
9. Recipient must provide documentation of an administrative agency's or court's findings of non-compliance of Title VI and efforts to address the non-compliance, including any voluntary compliance or other



agreements between the Recipient and the administrative agency that made the finding. If the Recipient settles a case or matter alleging such discrimination, the Recipient must provide documentation of the settlement. If Recipient has not been the subject of any court or administrative agency finding of discrimination, please so state.

- 10. If the Recipient makes sub-awards to other agencies or other entities, the Recipient is responsible for ensuring that sub-recipients also comply with Title VI and other applicable authorities covered in this document. State agencies that make sub-awards must have in place standard grant assurances and review procedures to demonstrate that they are effectively monitoring the civil rights compliance of sub-recipients.

The United States of America has the right to seek judicial enforcement of the terms of this assurances document and nothing in this document alters or limits the federal enforcement measures that the United States may take in order to address violations of this document or applicable federal law.

Under penalty of perjury, the undersigned official(s) certifies that official(s) has read and understood the Recipient's obligations as herein described, that any information submitted in conjunction with this assurances document is accurate and complete, and that the Recipient is in compliance with the aforementioned nondiscrimination requirements.

Mayor
Cooper City, City of

[Signature]
Signature of Authorized Official

August 24, 2021
Date

PAPERWORK REDUCTION ACT NOTICE

The information collected will be used for the U.S. Government to process requests for support. The estimated burden associated with this collection of information is 30 minutes per response. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be directed to the Office of Privacy, Transparency and Records, Department of the Treasury, 1500 Pennsylvania Ave., N.W., Washington, D.C. 20220. DO NOT send the form to this address. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid control number assigned by OMB.



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

OMB Approved No. 1505-0271
Expiration Date: November 30, 2021

U.S. DEPARTMENT OF THE TREASURY
CORONAVIRUS STATE AND LOCAL FISCAL RECOVERY FUNDS

Recipient name and address:

Cooper City, City of

Address:

DUNS Number: 024478224

Taxpayer Identification Number: 596032417

Assistance Listing Number: 21.027

Sections 602(b) and 603(b) of the Social Security Act (the Act) as added by section 9901 of the American Rescue Plan Act, Pub. L. No. 117-2 (March 11, 2021) authorize the Department of the Treasury (Treasury) to make payments to certain recipients from the Coronavirus State Fiscal Recovery Fund and the Coronavirus Local Fiscal Recovery Fund.

Recipient hereby agrees, as a condition to receiving such payment from Treasury, to the terms attached hereto.

Recipient: Cooper City, City of

Authorized Representative.

Title: Mayor

Date signed:

U.S. Department of the Treasury:

Authorized Representative:

Title:

Date:

PAPERWORK REDUCTION ACT NOTICE

The information collected will be used for the U.S. Government to process requests for support. The estimated burden associated with this collection of information is 15 minutes per response. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be directed to the Office of Privacy, Transparency and Records, Department of the Treasury, 1500 Pennsylvania Ave., N.W., Washington, D.C. 20220. DO NOT send the form to this address. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid control number assigned by OMB.



U.S. DEPARTMENT OF THE TREASURY
CORONAVIRUS LOCAL FISCAL RECOVERY FUND
AWARD TERMS AND CONDITIONS

1. Use of Funds.
 - a. Recipient understands and agrees that the funds disbursed under this award may only be used in compliance with section 603(c) of the Social Security Act (the Act), Treasury's regulations implementing that section, and guidance issued by Treasury regarding the foregoing.
 - b. Recipient will determine prior to engaging in any project using this assistance that it has the institutional, managerial, and financial capability to ensure proper planning, management, and completion of such project.
2. Period of Performance. The period of performance for this award begins on the date hereof and ends on December 31, 2026. As set forth in Treasury's implementing regulations, Recipient may use award funds to cover eligible costs incurred during the period that begins on March 3, 2021, and ends on December 31, 2024.
3. Reporting. Recipient agrees to comply with any reporting obligations established by Treasury as they relate to this award.
4. Maintenance of and Access to Records
 - a. Recipient shall maintain records and financial documents sufficient to evidence compliance with section 603(c) of the Act, Treasury's regulations implementing that section, and guidance issued by Treasury regarding the foregoing.
 - b. The Treasury Office of Inspector General and the Government Accountability Office, or their authorized representatives, shall have the right of access to records (electronic and otherwise) of Recipient in order to conduct audits or other investigations.
 - c. Records shall be maintained by Recipient for a period of five (5) years after all funds have been expended or returned to Treasury, whichever is later.
5. Pre-award Costs. Pre-award costs, as defined in 2 C.F.R. § 200.458, may not be paid with funding from this award.
6. Administrative Costs. Recipient may use funds provided under this award to cover both direct and indirect costs.
7. Cost Sharing. Cost sharing or matching funds are not required to be provided by Recipient.
8. Conflicts of Interest. Recipient understands and agrees it must maintain a conflict of interest policy consistent with 2 C.F.R. § 200.318(c) and that such conflict of interest policy is applicable to each activity funded under this award. Recipient and subrecipients must disclose in writing to Treasury or the pass-through entity, as appropriate, any potential conflict of interest affecting the awarded funds in accordance with 2 C.F.R. § 200.112.

9. Compliance with Applicable Law and Regulations.

- a. Recipient agrees to comply with the requirements of section 603 of the Act, regulations adopted by Treasury pursuant to section 603(f) of the Act, and guidance issued by Treasury regarding the foregoing. Recipient also agrees to comply with all other applicable federal statutes, regulations, and executive orders, and Recipient shall provide for such compliance by other parties in any agreements it enters into with other parties relating to this award.
- b. Federal regulations applicable to this award include, without limitation, the following:
 - i. Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, 2 C.F.R. Part 200, other than such provisions as Treasury may determine are inapplicable to this Award and subject to such exceptions as may be otherwise provided by Treasury. Subpart F – Audit Requirements of the Uniform Guidance, implementing the Single Audit Act, shall apply to this award.
 - ii. Universal Identifier and System for Award Management (SAM), 2 C.F.R. Part 25, pursuant to which the award term set forth in Appendix A to 2 C.F.R. Part 25 is hereby incorporated by reference.
 - iii. Reporting Subaward and Executive Compensation Information, 2 C.F.R. Part 170, pursuant to which the award term set forth in Appendix A to 2 C.F.R. Part 170 is hereby incorporated by reference.
 - iv. OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement), 2 C.F.R. Part 180, including the requirement to include a term or condition in all lower tier covered transactions (contracts and subcontracts described in 2 C.F.R. Part 180, subpart B) that the award is subject to 2 C.F.R. Part 180 and Treasury's implementing regulation at 31 C.F.R. Part 19.
 - v. Recipient Integrity and Performance Matters, pursuant to which the award term set forth in 2 C.F.R. Part 200, Appendix XII to Part 200 is hereby incorporated by reference.
 - vi. Governmentwide Requirements for Drug-Free Workplace, 31 C.F.R. Part 20.
 - vii. New Restrictions on Lobbying, 31 C.F.R. Part 21.
 - viii. Uniform Relocation Assistance and Real Property Acquisitions Act of 1970 (42 U.S.C. §§ 4601-4655) and implementing regulations.
 - ix. Generally applicable federal environmental laws and regulations.
- c. Statutes and regulations prohibiting discrimination applicable to this award include, without limitation, the following:
 - i. Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d et seq.) and

- Treasury's implementing regulations at 31 C.F.R. Part 22, which prohibit discrimination on the basis of race, color, or national origin under programs or activities receiving federal financial assistance;
- ii. The Fair Housing Act, Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 et seq.), which prohibits discrimination in housing on the basis of race, color, religion, national origin, sex, familial status, or disability;
 - iii. Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of disability under any program or activity receiving federal financial assistance;
 - iv. The Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101 et seq.), and Treasury's implementing regulations at 31 C.F.R. Part 23, which prohibit discrimination on the basis of age in programs or activities receiving federal financial assistance; and
 - v. Title II of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. §§ 12101 et seq.), which prohibits discrimination on the basis of disability under programs, activities, and services provided or made available by state and local governments or instrumentalities or agencies thereto.
10. Remedial Actions. In the event of Recipient's noncompliance with section 603 of the Act, other applicable laws, Treasury's implementing regulations, guidance, or any reporting or other program requirements, Treasury may impose additional conditions on the receipt of a subsequent tranche of future award funds, if any, or take other available remedies as set forth in 2 C.F.R. § 200.339. In the case of a violation of section 603(c) of the Act regarding the use of funds, previous payments shall be subject to recoupment as provided in section 603(e) of the Act.
11. Hatch Act. Recipient agrees to comply, as applicable, with requirements of the Hatch Act (5 U.S.C. §§ 1501-1508 and 7324-7328), which limit certain political activities of State or local government employees whose principal employment is in connection with an activity financed in whole or in part by this federal assistance.
12. False Statements. Recipient understands that making false statements or claims in connection with this award is a violation of federal law and may result in criminal, civil, or administrative sanctions, including fines, imprisonment, civil damages and penalties, debarment from participating in federal awards or contracts, and/or any other remedy available by law.
13. Publications. Any publications produced with funds from this award must display the following language: "This project [is being] [was] supported, in whole or in part, by federal award number [enter project FAIN] awarded to [name of Recipient] by the U.S. Department of the Treasury."
14. Debts Owed the Federal Government.
- a. Any funds paid to Recipient (1) in excess of the amount to which Recipient is finally determined to be authorized to retain under the terms of this award; (2) that are

determined by the Treasury Office of Inspector General to have been misused; or (3) that are determined by Treasury to be subject to a repayment obligation pursuant to section 603(e) of the Act and have not been repaid by Recipient shall constitute a debt to the federal government.

- b. Any debts determined to be owed the federal government must be paid promptly by Recipient. A debt is delinquent if it has not been paid by the date specified in Treasury's initial written demand for payment, unless other satisfactory arrangements have been made or if the Recipient knowingly or improperly retains funds that are a debt as defined in paragraph 14(a). Treasury will take any actions available to it to collect such a debt.

15. Disclaimer.

- a. The United States expressly disclaims any and all responsibility or liability to Recipient or third persons for the actions of Recipient or third persons resulting in death, bodily injury, property damages, or any other losses resulting in any way from the performance of this award or any other losses resulting in any way from the performance of this award or any contract, or subcontract under this award.
- b. The acceptance of this award by Recipient does not in any way establish an agency relationship between the United States and Recipient.

16. Protections for Whistleblowers.

- a. In accordance with 41 U.S.C. § 4712, Recipient may not discharge, demote, or otherwise discriminate against an employee in reprisal for disclosing to any of the list of persons or entities provided below, information that the employee reasonably believes is evidence of gross mismanagement of a federal contract or grant, a gross waste of federal funds, an abuse of authority relating to a federal contract or grant, a substantial and specific danger to public health or safety, or a violation of law, rule, or regulation related to a federal contract (including the competition for or negotiation of a contract) or grant.
- b. The list of persons and entities referenced in the paragraph above includes the following:
 - i. A member of Congress or a representative of a committee of Congress;
 - ii. An Inspector General;
 - iii. The Government Accountability Office;
 - iv. A Treasury employee responsible for contract or grant oversight or management;
 - v. An authorized official of the Department of Justice or other law enforcement agency;
 - vi. A court or grand jury; or
 - vii. A management official or other employee of Recipient, contractor, or subcontractor who has the responsibility to investigate, discover, or address misconduct.
- c. Recipient shall inform its employees in writing of the rights and remedies provided under this section, in the predominant native language of the workforce.

17. Increasing Seat Belt Use in the United States. Pursuant to Executive Order 13043, 62 FR



19217 (Apr. 18, 1997), Recipient should encourage its contractors to adopt and enforce on-the-job seat belt policies and programs for their employees when operating company-owned, rented or personally owned vehicles.

18. Reducing Text Messaging While Driving. Pursuant to Executive Order 13513, 74 FR 51225 (Oct. 6, 2009), Recipient should encourage its employees, subrecipients, and contractors to adopt and enforce policies that ban text messaging while driving, and Recipient should establish workplace safety policies to decrease accidents caused by distracted drivers.

[END OF SECTION]



ATTACHMENT V BUY AMERICAN ACT AFFIDAVIT
(Page 1 of 2)
[THIS FORM TO BE COMPLETED IF SEEKING EXCEPTION]
BUY AMERICAN ACT

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the CITY OF COOPER CITY, FLORIDA

by: _____
(print individual's name and title)

for: _____
(print name of entity submitting sworn statement)

whose business address is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is: _____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____ - _____ - _____.)

I, being duly first sworn state:

That the above named firm, corporation or organization is in compliance with and agreed to continue to comply with, and assure that any subcontractor, or third party contractor under this project complies with all applicable requirements of the laws listed below including, but not limited to, those provisions pertaining to employment, provision of programs and services, transportation, communications, access to facilities, renovations, and new construction.

As required by the Buy American provision, all products must be of domestic origin as required by 41 U.S.C. Ch. 83.

Exceptions to the Buy American provision should be used as a last resort; however, an alternative or exception may be approved upon request. To be considered for the alternative or exception, the request must be submitted in writing to a designated official. The request must include the:

- Alternative substitute(s) that are domestic and meet the required specifications:
 - Availability of the domestic alternative substitute(s) in relation to the quantity ordered
- Reason for exception: limited/lack of availability or price (include price):
 - Price of the domestic product; and
 - Price of the non-domestic product that meets the required specification of the domestic product.



ATTACHMENT V
(Page 2 of 2)

The Respondent agrees that, to the greatest extent applicable, all equipment and products being proposed shall be American-made.

Signature of Affiant

Date

Print Name

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____.	
	<i>Name of person making statement</i>
	_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



ATTACHMENT W PROHIBITION AGAINST CONSIDERATION OF SOCIAL, POLITICAL OR IDEOLOGICAL INTERESTS AFFIDAVIT

I, _____, being first duly sworn state:

Respondents are hereby notified of the provisions of section 287.05701, Florida Statutes, as amended, that the City will not request documentation of or consider a Respondent’s social, political, or ideological interests when determining if the Respondent is a responsible Respondent. Respondents are further notified that the City’s governing body may not give preference to a Respondent based on the Respondent’s social, political, or ideological interests.

Signature of Affiant

Date

Print Name

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____	
	<i>Name of person making statement</i>
(NOTARY SEAL)	_____ <i>Signature of Notary Public - State of Florida</i>
	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____ OR Produced Identification _____	
Type of Identification Produced _____	



ATTACHMENT X COMPLIANCE WITH FOREIGN ENTITY LAWS AFFIDAVIT

This sworn statement is submitted to the CITY OF COOPER CITY, FLORIDA

by: _____
(print individual's name and title)

for: _____
(print name of entity submitting sworn statement)

whose business address is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is: _____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____ - _____ - _____.)

The company hereby attests under penalty of perjury the following:

- A. Entity is not owned by the government of a foreign country of concern as defined in Section 287.138, Florida Statutes. (Source: § 287.138(2)(a), Florida Statutes)
- B. The government of a foreign country of concern does not have a controlling interest in Entity. (Source: § 287.138(2)(b), Florida Statutes)
- C. Entity is not owned or controlled by the government of a foreign country of concern, as defined in Section 692.201, Florida Statutes. (Source: § 288.007(2), Florida Statutes)
- D. Entity is not a partnership, association, corporation, organization, or other combination of persons organized under the laws of or having its principal place of business in a foreign country of concern, as defined in Section 692.201, Florida Statutes, or a subsidiary of such entity. (Source: § 288.007(2), Florida Statutes)
- E. Entity is not a foreign principal, as defined in Section 692.201, Florida Statutes. (Source: § 692.202(5)(a)(1), Florida Statutes)
- F. Entity is in compliance with all applicable requirements of Sections 692.202, 692.203, and 692.204, Florida Statutes.
- G. (Only applicable if purchasing real property) Entity is not a foreign principal prohibited from purchasing the subject real property. Entity is either (a) not a person or entity described in Section 692.204(1)(a), Florida Statutes, or (b) authorized under Section 692.204(2), Florida Statutes, to purchase the subject property. Entity is in compliance with the requirements of Section 692.204, Florida Statutes. (Source: §§ 692.203(6)(a), 692.204(6)(a), Florida Statutes)



ATTACHMENT X
(Page 2 of 2)

Signature of Affiant

Date

Print Name

STATE:	FLORIDA
COUNTY:	_____
Sworn to (or affirmed) and subscribed before me this ____ day of _____, 20__, by: _____.	
	<i>Name of person making statement</i>
	_____ <i>Signature of Notary Public - State of Florida</i>
(NOTARY SEAL)	_____ <i>Name of Notary Typed, Printed, or Stamped</i>
Personally Known _____	OR Produced Identification _____
Type of Identification Produced _____	



SUMMARY OF TERMS AND CONDITIONS

**CONTRACT BETWEEN COOPER CITY AND _____
 FOR _____**

Project Title:	Effluent Pump #3 Replacement
Location:	WWTP located at 11791 SW 49th Street, Cooper City, Florida, 33330
ITB Number:	2023-05-UTL
Contract Number:	
Project Number:	

General Contractor:	
Contractor Address:	
Federal Identification No.:	__ - _____

Contract Administrator:	
Contract Administrator Address:	

Consultant:	Hazen and Sawyer
Consultant Address:	4000 Hollywood Blvd, Suite 750 North Hollywood, Florida 33021

Article	Description	Unit
3.2	Substantial Completion	335 Days after the Project Initiation Date in NTP
3.2	Final Completion	30 Days after Substantial Completion
3.3	[If applicable] Liquidated Damages for each calendar day after time specified in Notice to Proceed	\$2,000 per day
3.3	Liquidated Damages for each calendar day after time specified for Substantial Completion	\$2,000 per day
3.3	Liquidated Damages for each calendar day after time specified for Final Completion	\$2,000 per day
3.3	[If applicable] Liquidated Damages for each calendar day after time specified for interim Milestones (or phase): [Milestones 1, 2, 3, etc.: Division 1, Section _____]	Interim Milestone #1 \$_____ per day
		Interim Milestone #2 \$_____ per day
		Interim Milestone #3 \$_____ per day



Article	Description	Unit
8.4	The Parties designate the following as the respective places for giving of notice:	For City: _____ _____ For Contractor: _____ _____
42 (General Conditions)	Compensable Excusable Delay for each calendar day beyond the Contract Time.	\$365 per day
54 (General Conditions)	<input type="checkbox"/> County Business Enterprise (CBE) or Small Business Enterprise (SBE) commitment	As awarded _____%

[END OF SECTION]



AGREEMENT

THIS IS AN AGREEMENT (“Agreement”), dated this ____ day of _____ 20____, by and between:

CITY OF COOPER CITY, a municipal corporation organized and existing under the laws of the State of Florida and whose address is 9090 SW 50th Place, Cooper City, Florida 33328 (“City”),
and

_____, a _____-corporation, located at _____, hereinafter "Contractor," who is authorized to do business in the State of Florida.

City and Contractor may each be referred to herein as “party” or collectively as “parties

WITNESSETH

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, and other good and valuable consideration, the receipt and adequacy of which are acknowledged, the parties agree as follows:

PREAMBLE

In order to establish the background, context and form of reference for this Agreement and to generally express the objectives, and intensions of the respective parties herein, the following statements, representations and explanations shall be accepted as predicates for the undertakings and commitments included within the provisions which follow and may be relied upon the parties as essential elements of the mutual considerations upon which this Agreement is based.

ARTICLE 1. DEFINITIONS

Whenever the following terms appear in the Contract Documents, the intent and meaning shall be interpreted as follows:

- 1.1. **Applicable Law** means all applicable laws, codes, advisory circulars, rules, regulations, or ordinances of any federal, state, county, municipal, or other governmental entity, including as may be amended from time to time.
- 1.2. **Bidder** means an entity or individual submitting a bid for this Project, acting directly or through a duly authorized representative.
- 1.3. **City** means the City Commission of Cooper City, Florida, its successors and assigns.
- 1.4. **Code** means the City of Cooper City Code of Ordinances.



- 1.5. **Change Order** means a written document ordering a change in the Contract Price or Contract Time or a material change in the Work.
- 1.6. **Consultant** means the architect or engineer who has contracted with City of Cooper City or who is an employee of City of Cooper City, and provides professional services for this Project.
- 1.7. **Contract Administrator** means the Director of Utilities or Assistant Director of Utilities or such other person designated by the Director of Utilities in writing.
- 1.8. **Contract Documents** means the official documents setting forth bidding information, requirements, and contractual obligations for the Project and includes Articles 1 through 8 of this **Agreement**, the Contract Supplement, the General Conditions, the Supplemental General Conditions, the Scope of Work, Invitation to Bid, Addenda, Standard Instructions for Vendors, Special Instructions for Vendors, Plans, Drawings, Exhibits, General Requirements, Technical Specifications, Bid Forms, Record of Award by Board, Bonds, Notice of Award, Notice(s) to Proceed, Supplements, Representations and Certifications, Certificates, Project Forms, Closeout Forms, Purchase Order(s), Change Order(s), Field Order(s), Special Provisions, BIM and Electronic Media Submittal Requirements, and any additional documents the submission of which is required by this Project.
- 1.9. **Contract Price** means the amount established in the bid submittal and award by the Board, as may be amended by Change Order.
- 1.10. **Contract Time** means the time between commencement and completion of the Work, including any milestone dates thereof, established in Article 3 of this Contract, as may be amended by Change Order.
- 1.11. **Contractor** means the person, firm, or corporation with whom City of Cooper City has contracted and who is responsible for the acceptable performance of the Work and for the payment of all legal debts or other obligations pertaining to the Work. All references in the Contract Documents to third parties under contract or control of Contractor shall be deemed to be a reference to Contractor.
- 1.12. **County Business Enterprise** or **CBE** means a small business certified as meeting the applicable requirements of the Broward County Business Opportunity Act of 2012, Section 1-81, of the Code. Unless specified in the Contract Documents, this definition may not apply.
- 1.13. **Field Order** means a written order that orders minor changes in the Work but which does not involve a change in the Contract Price or Contract Time.
- 1.14. **Final Completion** means the date certified by Consultant in the Final Certificate of Payment upon which all conditions and requirements of any permits and regulatory agencies have been satisfied; any documents required by the Contract Documents have been received by Consultant; any other documents required to be provided by Contractor have been received by Consultant; and to the best of Consultant's knowledge, information and belief, the Work



defined herein has been fully completed in accordance with the terms and conditions of the Contract Documents.

1.15. **Materials** means materials incorporated in this Project or used or consumed in the performance of the Work.

1.16. **Notice(s) to Proceed** means a written notice to Contractor authorizing the commencement of the activities identified in the notice or as described in the Contract Documents.

1.17. **Plans or Drawings** means the official graphic representations of this Project that are a part of the Contract Documents.

1.18. **Project** means the construction project described in the Contract Documents, including the Work described therein.

1.19. **Project Initiation Date** means the date upon which the Contract Time commences.

1.20. **Small Business Enterprise or SBE** means an entity certified as meeting the applicable requirements of the Broward County Business Opportunity Act of 2012, Section 1-81, of the Code. Unless specified in the Contract Documents, this definition may not apply.

1.21. **Subcontractor** means a person, firm, or corporation having a direct contract with Contractor, including one who furnishes material worked to a special design according to the Contract Documents, but does not include one who merely furnishes Materials not so worked.

1.22. **Substantial Completion** means that date, as certified in writing by Consultant and as finally determined by Contract Administrator in its sole discretion, on which the Work, or a portion thereof, is at a level of completion in substantial compliance with the Contract Documents such that all conditions of permits and regulatory agencies have been satisfied and City of Cooper City or its designee can enjoy use or occupancy and can use or operate it in all respects for its intended purpose. A Certificate of Occupancy (or a Temporary Certificate of Occupancy (“TCO”) or other alternate municipal/ City of Cooper City authorization for limited or conditional occupancy acceptable to the Contract Administrator) must be issued for Substantial Completion to be achieved; however, the issuance of a Certificate of Occupancy will not, by itself, constitute the achievement or date of Substantial Completion.

1.23. **Surety** means the surety company or individual that is bound by the performance bond and payment bond with and for Contractor who is primarily liable for satisfactory performance of the Work, and which surety company or individual is responsible for Contractor’s satisfactory performance of the Work under this Contract and for the payment of all debts and other obligations pertaining thereto in accordance with Section 255.05, Florida Statutes.

1.24. **Work** means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment, and



services provided or to be provided by Contractor to fulfill Contractor's obligations. The Work may constitute the whole or a part of the Project.

ARTICLE 2. SCOPE OF WORK

Contractor hereby agrees to furnish all of the labor, materials, equipment, services, and incidentals necessary to perform all of the Work described in the Contract Documents for the Project.

ARTICLE 3. CONTRACT TIME

3.1. Contractor shall be instructed to commence the Work by written instruction in the form of a Purchase Order issued by City's Finance Director or designee and two or more Notices to Proceed issued by the Contract Administrator. The first Notice to Proceed and Purchase Order will not be issued until Contractor's submission to City of Cooper City of all required documents and after execution of this Contract by both Parties. Preliminary Work, including submission of a project schedule, schedule of values, submittals, submittal schedule, and other documents required for permitting, and performance of Work that does not require permits, shall commence within ten (10) days after the date of the first Notice to Proceed. Contractor shall have ten (10) days after receipt of signed and sealed contract Drawings from Consultant to apply for construction permits to the applicable permitting authority. Issuance of all permits by the permitting authority shall be a condition precedent to the issuance of a second Notice to Proceed for all additional Work. Except for the reimbursement of permit application fees, impact fees, and performance and payment bond premiums as may be provided in the Contract Documents, Contractor shall not be entitled to compensation of any kind during the permitting process. The Work to be performed pursuant to the second Notice to Proceed shall commence within ten (10) days after the Project Initiation Date specified in the second Notice to Proceed.

3.2. Time is of the essence for each Party's performance under this Contract. Contractor must obtain Substantial Completion of the Work within 335 calendar days after the Project Initiation Date specified in the second Notice to Proceed, and Final Completion within 30 calendar days after Substantial Completion.

3.3. Upon failure of Contractor to obtain Substantial Completion within the deadline stated in Section 3.2, as extended by any approved time extensions, Contractor shall pay to City of Cooper City the sum of one thousand dollars (\$2,000) for each day after the deadline for Substantial Completion, as extended by any approved time extensions, until Substantial Completion is obtained. After Substantial Completion, should Contractor fail to complete the remaining Work within the deadline stated in Section 3.2, as extended by approved time extensions thereof, Contractor shall pay to City of Cooper City the sum of one thousand dollars (\$2,000) for each day after the deadline for Final Completion, as extended by any approved extensions, until Final Completion is obtained. These amounts are not penalties but are liquidated damages to City of Cooper City for its inability to obtain full beneficial occupancy and/or use of the Project. Liquidated damages are hereby fixed and agreed upon between the



Parties based on (1) a mutual recognition of the impossibility of precisely ascertaining the amount of damages that will be sustained by City of Cooper City as a consequence of Contractor's failure to timely obtain Substantial Completion; and (2) both Parties' desire to obviate any question or dispute concerning the amount of said damages and the cost and effect of the failure of Contractor to complete this Contract on time. These liquidated damages shall apply separately to each portion of the Project for which a deadline for completion is given.

3.4. City of Cooper City may deduct liquidated damages from monies due to Contractor for the Work under this Contract or as much thereof as City of Cooper City may, in its sole discretion, deem just and reasonable.

3.5. Contractor shall reimburse City, in addition to liquidated damages, for all costs incurred by Consultant in administering the construction of the Project beyond the completion dates specified above, as extended by any approved time extensions. Consultant construction administration costs shall be in the amounts set forth in the contract between City of Cooper City and Consultant, a copy of which is available upon request of the Contract Administrator. All such costs shall be deducted from the monies due Contractor for performance of Work under this Contract by means of unilateral credit Change Orders issued by City of Cooper City as costs are incurred by Consultant and agreed to by City.

ARTICLE 4. CONTRACT PRICE

4.1. This is a Unit Price Contract:*

4.1.1. City of Cooper City shall pay to Contractor the amounts determined for the total number of each of the units of Work completed at the unit price stated in the Contract Price. The number of units contained in this schedule is an estimate only, and final payment shall be made for the actual number of units incorporated in or made necessary by the Work covered by the Contract Documents.

4.1.2. Payment shall be made at the unit prices applicable to each integral part of the Work. These prices shall be full compensation for all costs, including overhead and profit, associated with completion of all the Work in full conformity with the requirements as stated or shown, or both, in the Contract Documents. The cost of any item of Work not covered by a specific Contract unit price shall be included in the Contract unit price or lump sum price to which the item is most applicable.

4.2. This is a Lump Sum Contract:*

4.2.1. City of Cooper City shall pay Contractor the Contract Price for the performance of the Work described in the Contract Documents.

4.2.2. Payment shall be at the lump sum price stated in this Contract. This price shall be full compensation for all costs, including overhead and profit, associated with completion of all the Work in full conformity with the requirements as stated or shown,



or both, in the Contract Documents. The cost of any item of Work not covered by a specific Contract lump sum should be included in the lump sum price to which the item is most applicable.

***Note:** Only the subsections corresponding to any checked box in this Article 4 will apply to this Contract. Some Projects include both unit prices and lump sums, in which case both subsections shall apply as appropriate depending upon the type of Work being performed by Contractor and approved by City.

ARTICLE 5. PROGRESS PAYMENTS

5.1. Contractor may make an application for payment (“Application for Payment”), at intervals of not more than once a month, for Work completed during the Project. Contractor shall, where the Project involves CBE or SBE Subcontractors, make Application for Payment, at monthly intervals, for Work completed by such Subcontractors during the Project. Contractor’s applications shall show a complete breakdown of the Project components, the quantities completed, and the amount of payment sought, together with such supporting evidence as may be required by Consultant or Contract Administrator. Contractor shall submit with each Application for Payment: an updated progress schedule acceptable to Consultant as required by the Contract Documents; a Certification of Payments to Subcontractors Form (Form 9); a statement indicating the cumulative amount of CBE or SBE participation to date; and a release of claims relative to the Work that was the subject of previous applications or consent of surety relative to the Work that is the subject of the Application for Payment. If Contractor has not made payment to a Subcontractor, the Certification of Payments to Subcontractors Form shall be accompanied by a copy of the notification sent to each Subcontractor (listed in Item 2 of the Form) to whom payment has not been made, explaining the good cause why payment was not made. When applicable, an Application for Payment shall be accompanied by a completed Statement of Wage Compliance Form (Form 8A or 8B). Each Application for Payment shall be submitted in triplicate to Consultant for approval as follows:

CONSULTANT _____ with a copy to:

CONTRACT ADMINISTRATOR _____

All Applications for Payment shall be stamped as received on the date on which they are delivered in the manner specified above. Payments of Applications for Payment shall be subject to approval as specified hereinbefore, and if approved shall be due twenty-five (25) business days after the date on which the Application for Payment is stamped received. At the end of the twenty-five (25) business days, Contractor may send the Contract Administrator an overdue notice. If the Application for Payment is not rejected within four (4) business days after delivery of the overdue notice, the Application for Payment shall be deemed accepted, except for any portion of the Application for Payment that City of Cooper City determines to be fraudulent or misleading. If the Application for Payment does not meet the requirements of this Contract, City of Cooper City shall reject the Application for Payment within twenty (20) business days



after the date stamped received and said rejection shall specify the deficiency and the action necessary to cure that deficiency. If Contractor submits a request that corrects the deficiency, the corrected Application for Payment must be paid or rejected within ten (10) business days after the corrected Application for Payment is stamped as received. Any dispute between City of Cooper City and Contractor shall be resolved by the Florida Statute 218.735 subject to the process and time frames for payment set forth above. For all other disputes related to payment, the dispute shall be resolved pursuant to the dispute resolution procedure set forth in Article 12 of the General Conditions.

5.2. City of Cooper City may withhold retainage on each progress payment as set forth in Section 255.078, Florida Statutes, as may be amended during this Contract. Any reduction in retainage below the maximum amount set forth in Section 255.078, Florida Statutes, shall be at the sole discretion of the Contract Administrator, as may be recommended by Consultant. Any interest earned on retainage shall accrue to the benefit of City.

5.3. Notwithstanding any provision of this Contract to the contrary, City of Cooper City may withhold payment, in whole or in part, in accordance with Applicable Law, or to such extent as may be necessary to protect itself from loss on account of:

5.3.1 Inadequate or defective Work not remedied.

5.3.2 Claims filed or reasonable evidence indicating probable filing of claims by other parties against Contractor or City of Cooper City relating to Contractor's performance.

5.3.3 Failure of Contractor to make payments properly to Subcontractors or for material or labor.

5.3.4 Damage to another contractor not remedied.

5.3.5 Liquidated damages and costs incurred by Consultant for extended construction administration.

5.3.6 Failure of Contractor to provide documents required by the Contract Documents.

When the above grounds are removed or resolved to the satisfaction of the Contract Administrator, any withheld payment shall be made to the extent otherwise due.

5.4 Invoices shall be emailed MONTHLY to Accountspayable@CooperCity.gov or sent via US Mail to City of Cooper City, 9090 SW 50th Place, Cooper City, FL 33328. All invoices must reference the applicable Work Authorization and/or Bid number.

ARTICLE 6. ACCEPTANCE AND FINAL PAYMENT

6.1. Upon receipt of written notice from Contractor that the Work is ready for final inspection and acceptance, Consultant shall conduct an inspection within ten (10) days. If



Consultant and Contract Administrator find that the Work is acceptable; that the requisite documents have been submitted; that the requirements of the Contract Documents are fully satisfied; and that all conditions of the permits and regulatory agencies have been met, a Final Certificate of Payment (Form 11) shall be issued by Consultant, under its signature, stating that the requirements of the Contract Documents have been performed and that the Work is ready for acceptance under the terms and conditions of the Contract Documents.

6.2. Before issuance of the Final Certificate for Payment, Contractor shall deliver to Consultant the following Final Payment Package: a complete release of all claims arising out of this Contract, or receipts in full in lieu thereof; an affidavit certifying that all suppliers and Subcontractors have been paid in full and that all other indebtedness and financial obligations connected with the Work have been paid, or, in the alternative, a consent of the Surety to final payment on Contractor's behalf; the final corrected as-built Drawings; and the final bill of Materials, if required, and the final Application for Payment. This Final Payment Package must include the certification document titled Final List of Non-Certified Subcontractors and Suppliers (Form 13), which must be signed and notarized by Contractor. A list of all noncertified Subcontractors and suppliers used must be attached to this certified document.

6.3. If, after Substantial Completion, Final Completion is materially delayed through no fault of Contractor, and Consultant so certifies, City of Cooper City shall, upon certification of Consultant, and without terminating this Contract, make payment of the balance due for any portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, but it shall not constitute a waiver of claims.

6.4. Final payment shall be made only after the Board or Director of Purchasing, as applicable, has reviewed a written evaluation of the performance of Contractor prepared by the Contract Administrator and has approved the final payment. The acceptance of final payment shall constitute a waiver of all claims by Contractor, except those previously made in strict accordance with the provisions of the General Conditions and identified by Contractor as unsettled at the time of the application for final payment.

ARTICLE 7. REPRESENTATIONS AND WARRANTIES

7.1. Representation of Authority. Contractor represents and warrants that this Contract constitutes the legal, valid, binding, and enforceable obligation of Contractor, and that neither the execution nor performance of this Contract constitutes a breach of any agreement that Contractor has with any third party or violates Applicable Law. Contractor further represents and warrants that execution of this Contract is within Contractor's legal powers, and each individual executing this Contract on behalf of Contractor is duly authorized by all necessary and appropriate action to do so on behalf of Contractor and does so with full legal authority.

7.2. Solicitation Representations. Contractor represents and warrants that all statements and representations made in Contractor's proposal, bid, or other supporting documents submitted to City of Cooper City in connection with the solicitation, negotiation, or award of



this Contract, including during the procurement or evaluation process, were true and correct when made and are true and correct as of the date Contractor executes this Contract, unless otherwise expressly disclosed in writing by Contractor.

7.3. Contingency Fee. Contractor represents that it has not paid or agreed to pay any person or entity, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Contract.

7.4. Public Entity Crimes. Contractor represents that it is familiar with the requirements and prohibitions of the Public Entity Crime Act, Section 287.133, Florida Statutes, and represents that its entry into this Contract will not violate that Act. In addition to the foregoing, Contractor further represents that there has been no determination that it committed a “public entity crime” as defined by Section 287.133, Florida Statutes, and that it has not been formally charged with committing an act defined as a “public entity crime,” regardless of the amount of money involved or whether Contractor has been placed on the convicted vendor list.

7.5. Discriminatory Vendor and Scrutinized Companies List; Countries of Concern. Contractor represents that it has not been placed on the discriminatory vendor list as provided in Section 287.134, Florida Statutes, and that it is not a “scrutinized company” pursuant to Sections 215.473 or 215.4725, Florida Statutes. Contractor further represents that it is not, and for the duration of the Contract will not be, ineligible to contract with City of Cooper City on any of the grounds stated in Section 287.135, Florida Statutes. Contractor represents that it is, and for the duration of this Contract will remain, in compliance with Section 286.101, Florida Statutes.

7.6. Claims Against Contractor. Contractor represents and warrants that there is no action or proceeding, at law or in equity, before any court, mediator, arbitrator, governmental or other board or official, pending or, to the knowledge of Contractor, threatened against or affecting Contractor, the outcome of which may (a) affect the validity or enforceability of this Contract, (b) materially and adversely affect the authority or ability of Contractor to perform its obligations under this Contract, or (c) have a material and adverse effect on the consolidated financial condition or results of operations of Contractor or on the ability of Contractor to conduct its business as presently conducted or as proposed or contemplated to be conducted.

7.7. Verification of Employment Eligibility. Contractor represents that Contractor and each Subcontractor have registered with and use the E-Verify system maintained by the United States Department of Homeland Security to verify the work authorization status of all newly hired employees in compliance with the requirements of Section 448.095, Florida Statutes, and that entry into this Contract will not violate that statute. If Contractor violates this section, City of Cooper City may immediately terminate this Contract for cause and Contractor shall be liable for all costs incurred by City of Cooper City due to the termination.

7.8. Warranty of Performance. Contractor represents and warrants that it possesses the knowledge, skill, experience, and financial capability required to perform and provide all Work



and that each person and entity that will perform or provide Work is duly qualified to perform such Work by all appropriate governmental authorities, where required, and is sufficiently experienced and skilled in the area(s) for which such person or entity will render such Work. Contractor represents and warrants that the Work shall be performed in a skillful and respectful manner, and that the quality of all such Work shall equal or exceed prevailing industry standards for such Work.

7.9. Truth-In-Negotiation Representation. Contractor's compensation under this Contract is based upon its representations to City, and Contractor certifies that the wage rates, factual unit costs, and other information supplied to substantiate Contractor's compensation, including without limitation those made by Contractor during the negotiation of this Contract, are accurate, complete, and current as of the date Contractor executes this Contract. Contractor's compensation may be reduced by City, in its sole discretion, to correct any inaccurate, incomplete, or noncurrent information provided to City of Cooper City as the basis for Contractor's compensation in this Contract.

7.10. Prohibited Telecommunications Equipment. Contractor represents and certifies that Contractor and all Subcontractors do not use any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, as such terms are used in 48 CFR §§ 52.204-24 through 52.204-26. Contractor represents and certifies that Contractor and all Subcontractors shall not provide or use such covered telecommunications equipment, system, or services at any time during the term of this Contract.

7.11. Criminal History Screening Practices. In addition to any City Code or policy, Contractor represents and certifies that Contractor will also comply with Section 26-125(d) of the Broward County Code for the duration of the Contract.

7.12. Breach of Representations. Contractor acknowledges that City of Cooper City is materially relying on the representations, warranties, and certifications of Contractor stated in this article, and City of Cooper City shall be entitled to exercise any or all of the following remedies if any such representation, warranty, or certification is untrue: (a) recovery of damages incurred; (b) termination of this Contract without any further liability to Contractor; (c) set off from any amounts due Contractor the full amount of any damage incurred; and (d) debarment of Contractor.

ARTICLE 8. MISCELLANEOUS

8.1. Contract Documents and Priority of Provisions. In the event of any conflict between the terms contained in this Contract and those contained in a Contract Supplement, the terms of such Contract Supplement shall prevail. Furthermore, in the event of any conflict between the terms of the General Conditions included in this Contract and those contained in any General Supplemental Provisions, the terms of such General Supplemental Provisions shall prevail. In addition, anything shown on the drawings and not mentioned in the specifications or



mentioned in the specifications and not shown on the drawings, shall have the same effect as if shown or mentioned respectively in both. In the event of a conflict among the Contract Documents, Contractor shall provide the latest, most stringent, and more technical requirement(s), including, but not limited to, the requirements setting forth the better quality or greater quantity.

Notwithstanding the forgoing, the following priority of provisions shall apply in the event of a conflict:

- First Priority: Approved Change Orders, Addendums, or Amendments
- Second Priority: Technical Specifications
- Third Priority: Supplemental Conditions or Special Terms
- Fourth Priority: General Terms and Conditions
- Fifth Priority: Contract
- Sixth Priority: Solicitation documents
- Seventh Priority: Contractor’s response to solicitation documents

8.2. Independent Contractor. Contractor is an independent contractor under this Contract. Work provided by Contractor pursuant to this Contract shall be subject to the supervision of Contractor. In providing such services, neither Contractor nor its agents shall act as officers, employees, or agents of City. This Contract shall not constitute or make the Parties a partnership or joint venture.

8.3. Third-Party Beneficiaries. Neither Contractor nor City of Cooper City intends to directly or substantially benefit a third party by entering into this Contract. Therefore, the Parties agree that there are no third-party beneficiaries to this Contract (other than Consultant to the extent this Contract expressly provides Consultant with specific rights or remedies).

8.4. Notices. Unless otherwise stated herein, for notice to a Party to be effective under this Contract, notice must be sent via U.S. first-class mail, hand delivery, or commercial overnight delivery, each with a contemporaneous copy via email, to the addresses listed below and shall be effective upon mailing or hand delivery (provided the contemporaneous email is also sent). Addresses may be changed by the applicable Party giving notice of such change in accordance with this section.

FOR CITY:

City of Cooper City _____
 Attn: _____ Ryan Eggleston, City Manager _____
 9090 SW 50th Place
 Cooper City, Florida 33328
 Email address: _____ reggleston@coopercity.gov _____
 With a copy to:
 Attn: Jacob Horowitz, City Attorney
 3099 East Commercial Boulevard, Suite 200



Fort Lauderdale, Florida 33308
Email address: JHorowitz@gorencherof.com

FOR CONTRACTOR:

Email address: _____

8.5. Assignment. Neither this Contract nor any interest herein or proceeds hereof shall be assigned, transferred, or encumbered without the written consent of the other party, and Contractor shall not subcontract any portion of the Work required by this Contract except as authorized by Article 28 of the General Conditions. Any attempted assignment, transfer, encumbrance, or subcontract in violation of this section shall be void and ineffective, and shall constitute a breach of this Contract. City of Cooper City reserves the right to condition its approval of any assignment, transfer, encumbrance, or subcontract upon further due diligence and an additional fee paid to City of Cooper City to reasonably compensate it for the performance of any such due diligence.

8.6. Materiality and Waiver of Breach. Each requirement, duty, and obligation set forth in this Contract was bargained for at arm’s-length and is agreed to by the Parties. Each requirement, duty, and obligation set forth herein is substantial and important to the formation of this Contract and is, therefore, a material term.

8.7. No Waiver. City’s failure to enforce any provision of this Contract shall not be deemed a waiver of its right or power to enforce such provision or a modification of this Contract. The failure to assert a breach of a provision of this Contract shall not be deemed a waiver of such breach or of any subsequent breach, nor shall it be construed to be a modification of the terms of this Contract.

8.8. Severability. If any part of this Contract is found to be unenforceable by a court of competent jurisdiction, that part shall be deemed severed from this Contract and the balance of this Contract shall remain in full force and effect.

8.9. Law, Jurisdiction, Venue, Waiver of Jury Trial. This Contract shall be interpreted and construed in accordance with and governed by the laws of the State of Florida. Jurisdiction of any controversies or legal problems arising out of this Contract, and any action involving the enforcement or interpretation of any rights hereunder, shall be exclusively in the state courts of the Seventeenth Judicial Circuit in Broward County, Florida, and venue for such litigation shall be exclusively in such state courts, forsaking any other jurisdiction that either party may claim by virtue of its residency or other jurisdictional device. **EACH PARTY HEREBY EACH EXPRESSLY WAIVES ANY RIGHTS IT MAY HAVE TO A TRIAL BY JURY OF ANY CIVIL LITIGATION RELATED TO THIS CONTRACT. IF A PARTY FAILS TO WITHDRAW A DEMAND FOR A JURY TRIAL AFTER WRITTEN NOTICE BY THE OTHER PARTY, THE PARTY MAKING THE DEMAND FOR JURY TRIAL**



SHALL BE LIABLE FOR REASONABLE ATTORNEYS' FEES AND COSTS OF THE OTHER PARTY TO CONTEST THE DEMAND FOR JURY TRIAL, AND SUCH AMOUNTS SHALL BE AWARDED BY THE COURT IN ADJUDICATING THE MOTION. CONTRACTOR, PURSUANT TO ARTICLE 28 OF THE GENERAL CONDITIONS, SHALL SPECIFICALLY BIND ALL SUBCONTRACTORS TO THE PROVISIONS OF THIS SECTION.

8.10. Amendments. Unless otherwise expressly authorized herein, no modification, amendment, or alteration of any portion of this Contract shall be effective unless contained in a written document executed with the same or similar formality as this Contract by duly authorized representatives of City of Cooper City and Contractor.

8.11. Prior Agreements. The Contract is the final and complete understanding of the Parties regarding the subject matter hereof and supersedes all prior and contemporaneous negotiations and discussions regarding that subject matter. All commitments, agreements, and understandings of the Parties concerning the subject matter of this Contract or the Contract Documents are contained herein.

8.12. Compliance with Laws. Contractor and the Work must comply with all Applicable Law, including, but not limited to, the Americans with Disabilities Act, 42 U.S.C. § 12101, Section 504 of the Rehabilitation Act of 1973, and the requirements of any applicable grant agreements.

8.13. **[THIS SUB-ARTICLE IS NOT APPLICABLE TO THIS CONTRACT]** Workforce Investment Program. This Contract constitutes a "Covered Contract" under the Broward Workforce Investment Program, Broward County Administrative Code Section 19.211 ("Workforce Investment Program"). Contractor affirms it is aware of the requirements of the Workforce Investment Program and agrees to use good faith efforts to meet the First Source Referral Goal and the Qualifying New Hires Goal as set forth therein, including by (a) publicly advertising any vacancies that are the direct result of this Contract (whether those vacancies are with Contractor or Subcontractor) exclusively with CareerSource Broward for at least five (5) business days and using good faith efforts to interview any qualified candidates referred under the Workforce Investment Program, and (b) using good faith efforts to hire Qualifying New Hires, as defined by the Workforce Investment Program, for at least fifty percent (50%) of the vacancies that are the direct result of this Contract. Until at least one year after the conclusion of this Contract, Contractor shall maintain and make available to City of Cooper City upon request all records documenting Contractor's compliance with the requirements of the Workforce Investment Program, and shall submit the required Workforce Investment Reports to the Contract Administrator annually by January 31 and within thirty (30) days after the expiration of termination of this Contract. Failure to demonstrate good faith efforts to meet the First Source Referral Goal and the Qualifying New Hires Goal shall constitute a material breach of this Contract.

8.14. Additional Security Requirements. Contractor certifies and represents that it will comply with the security requirements of the City and as mandated by the Federal and State governments for treatment plant facilities.



8.15. Federally Funded Contracts. Contractor certifies and represents that it will comply with the Federally Funded Contract Requirements attached hereto as Attachment U (ARPA Agreement).

8.16. Drug-Free Workplace. Pursuant to Section 21.23(f), Broward County Administrative Code, or Section 287.087, Florida Statutes, Contractor certifies that it has and will maintain a drug-free workplace program throughout the duration of this Contract.

8.17. Polystyrene Food Service Articles. Contractor shall not sell or provide for use on City property expanded polystyrene products or food service articles (e.g., Styrofoam), unencapsulated expanded polystyrene products, etc.

8.18. Regulatory Capacity. Notwithstanding the fact that City of Cooper City is a political subdivision with certain regulatory authority, City's performance under this Contract is as a Party to this Contract and not in its regulatory capacity. If City of Cooper City exercises its regulatory authority, the exercise of such authority and the enforcement of Applicable Law shall have occurred pursuant to City's regulatory authority as a governmental body separate and apart from this Contract, and shall not be attributable in any manner to City of Cooper City as a party to this Contract.

8.19. **[THIS SUB-ARTICLE IS NOT APPLICABLE TO THIS CONTRACT]** Construction Apprenticeship Program. If this Contract is a construction contract as defined in Section 26-9 of the Code, Contractor represents and certifies that it shall at all times comply with the requirements of the Construction Apprenticeship Program as set forth in Sections 26-8 through 26-11 of the Code.

8.20. Interpretation. The titles and headings in the Contract Documents are for reference purposes only and shall not in any way affect the meaning or interpretation of this Contract. All personal pronouns shall include any other gender, and the singular shall include the plural, and vice versa, unless the context otherwise requires. Terms such as "herein" refer to the Contract as a whole and not to any particular sentence, paragraph, or section where they appear, unless the context otherwise requires. Whenever reference is made to a section or article, such reference is to the section or article as a whole, including the subsections thereof, unless the reference is made to a particular subsection or subparagraph of such section or article. Any reference to "days" means calendar days, unless otherwise expressly stated. Any reference to approval by City of Cooper City shall require approval in writing, unless otherwise expressly stated.

8.21. Incorporation by Reference. Any and all Recital clauses stated above are true and correct and are incorporated in this Contract by reference. The attached Exhibits are incorporated into and made a part of this Contract.



8.22. Fiscal Year. The continuation of this Contract beyond the end of any City of Cooper City fiscal year is subject to both the appropriation and the availability of funds pursuant to Chapter 129 and, if applicable, Chapter 212, Florida Statutes.

8.23. Sovereign Immunity. Except to the extent sovereign immunity may be deemed to be waived by entering into this Contract, nothing herein is intended to serve as a waiver of sovereign immunity by City of Cooper City nor shall anything included herein be construed as consent by City of Cooper City to be sued by third parties in any matter arising out of this Contract.

8.24. Counterparts and Multiple Originals. This Contract may be executed in multiple originals, and may be executed in counterparts, whether signed physically or electronically, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

(The remainder of this page is intentionally left blank.)



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

IN WITNESS OF THE FOREGOING, the Parties hereunto set their hands and seals on dates written below.

CITY OF COOPER CITY, a Florida Municipal Corporation

BY: _____
Ryan Eggleston
CITY MANAGER

ATTEST:

BY: _____
CITY CLERK

BY: _____
GREG ROSS
MAYOR

APPROVED AS TO LEGAL FORM:

BY: _____
CITY ATTORNEY

WITNESSED BY: _____

Signature

BY: _____
(Florida Corporation or LLC)

Name: _____

Print Name

Title: _____

STATE OF _____

COUNTY OF _____

BEFORE ME, an officer duly authorized by law to administer oaths and take acknowledgements, personally appeared _____, as _____ of _____, and acknowledged that he has executed the foregoing instrument for the use and purposes mentioned in it and that the instrument is the act and deed of



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

_____, as _____ of _____, and who is personally known to me or has produced _____ as identification.

IN WITNESS WHEREOF, I have set my hand and seal in the State _____ and County aforesaid this _____ day of _____, 20____.

NOTARY PUBLIC

PRINT OR TYPE NAME

My Commission Expires: _____

[END OF PAGE]



CONTRACT SUPPLEMENT

[THIS SUPPLEMENT IS NOT APPLICABLE TO THIS CONTRACT]

[DELETE THIS PAGE IF NOT APPLICABLE]

The following deviations are incorporated herein and made a part of this Contract, revising the respective article and section as noted below.

Coding: Words in ~~striketrough~~ type are deletions from existing text. Words in underlined text are additions to existing text.



FORM 1: PERFORMANCE BOND

Project Name: Effluent Pump #3 Replacement
Project Number: ITB 2023-05-UTL

BY THIS BOND, We _____, as Principal, hereinafter called Contractor, located at _____, with a phone number of _____, and _____, as Surety, located at _____, with a phone number of _____, under the assigned Bond Number _____, are bound to Broward County, Florida, as Obligee, hereinafter called County, located at _____, with a phone number of _____, in the amount of _____ Dollars (\$_____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

WHEREAS, Contractor has by written agreement dated the _____ day of _____, 20____, entered into a Contract, Bid/Contract No. _____, with _____ County, the terms of which contract (including the Contract Documents, as those are defined in the contract) are incorporated by reference herein and made a part hereof as the "Contract," which includes any and all provisions for liquidated damages, and other damages identified.

THE CONDITION OF THIS BOND is that if Contractor:

- 1) Performs the Contract between Contractor and City of Cooper City for construction of _____, in the time and manner prescribed in the Contract; and
- 2) Pays City of Cooper City all losses, liquidated damages, expenses, costs and attorneys' fees including appellate proceedings, that City of Cooper City sustains as a result of default by Contractor under the Contract; and
- 3) Performs the guaranties of all Work (as defined in the Contract) and materials furnished under the Contract for the time specified in the Contract, then THIS BOND IS VOID; OTHERWISE IT REMAINS IN FULL FORCE AND EFFECT.

Whenever Contractor shall be, and is declared by City of Cooper City to be, in default under the Contract, with City of Cooper City having performed its obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

- a) Complete the required performance in accordance with the terms and conditions of the Contract Documents; or
- b) Obtain a bid or bids for completing the Project in accordance with the terms and conditions of the Contract Documents, and upon determination by Surety of the lowest responsible Bidder, or, if City of Cooper City elects, upon determination by City of Cooper City and Surety jointly of the lowest responsible Bidder, arrange for a contract between such Bidder and City of Cooper City on the same terms and conditions as the Contract Documents unless



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

otherwise agreed by County, and shall make available as Work progresses sufficient funds to pay the cost of completion of the Work required by the Contract in an amount less but not exceeding the balance of the Contract Price, which amount shall include other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by City of Cooper City to Contractor under the Contract and any amendments thereto, less the amount properly paid by City of Cooper City to Contractor.

No right of action shall accrue on this bond to or for the use of any person or corporation other than City of Cooper City named herein.

The Surety hereby waives notice of and agrees that any changes in or under the Contract Documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect Surety's obligation under this Bond.

Signed and sealed this _____ day of _____, 20__.

ATTEST:

CONTRACTOR

Corporate Secretary or other
person authorized to attest

By: _____
Authorized Signer

Print Name

Print Name and Title

_____ day of _____, 20__

(CORPORATE SEAL OR NOTARY)

IN THE PRESENCE OF:

SURETY:

Signature

By _____
Agent and Attorney-in-Fact

(Print Name)

(Print/Type Name)

Signature

Address: _____
(Street)

(City/State/Zip Code)

Telephone No.: _____



FORM 2: PAYMENT BOND

Project Name: Effluent Pump #3 Replacement
Project Number: ITB 2023-05-UTL

KNOW ALL BY THESE PRESENTS:

That we _____, as Principal (hereinafter called "Contractor"), located at _____, with a phone number of _____, and _____, as Surety, located at _____, with a phone number of _____, under the assigned Bond Number _____ and pursuant to Section 255.05, Florida Statutes, are bound to B City of Cooper City, Florida (hereinafter "City"), as Obligee, located at _____, with a phone number of _____, in the amount of _____ Dollars (\$_____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

WHEREAS, Contractor has by written agreement dated the ____ of _____, 20__, entered into a Contract, Bid/Contract No. _____, with City for construction of _____ located at _____, the terms of which contract (including the Contract Documents, as those are defined in the contract) are incorporated by reference herein and made a part hereof as the "Contract."

THE CONDITION OF THIS BOND is that if Contractor:

1. Pays City all losses, damages, expenses, costs and attorneys' fees including appellate proceedings, that City sustains because of default by Contractor under the Contract; and
2. Promptly makes payments to all claimants as defined by Florida Statute Section 255.05(1) for all labor, materials and supplies used directly or indirectly by Contractor in the performance of the Contract;

THEN CONTRACTOR'S OBLIGATION SHALL BE VOID; OTHERWISE, IT SHALL REMAIN IN FULL FORCE AND EFFECT SUBJECT, HOWEVER, TO THE FOLLOWING CONDITIONS:

- A. A claimant, except a laborer, who is not in privity with Contractor and who has not received payment for its labor, materials, or supplies shall, within forty-five (45) days after beginning to furnish labor, materials, or supplies for the prosecution of the Work (as defined in the Contract), furnish to Contractor a notice that he or she intends to look to the bond for protection.
- B. A claimant who is not in privity with Contractor and who has not received payment for its labor, materials, or supplies shall, within ninety (90) days after performance of the labor or after complete delivery of the materials or supplies, deliver to Contractor and to the Surety,



written notice of the performance of the labor or delivery of the materials or supplies and of the nonpayment.

C. No action for the labor, materials, or supplies may be instituted against Contractor or the Surety unless the notices stated under the preceding conditions (A) and/or (B), as applicable, have been given.

D. Any action under this Bond must be instituted in accordance with the Notice and Time Limitations provisions prescribed in Sections 255.05(2) and 255.05(10), Florida Statutes.

The Surety hereby waives notice of and agrees that any changes in or under the Contract Documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect the Surety's obligation under this Bond.

Signed and sealed this _____ day of _____, 20__.

ATTEST:

CONTRACTOR

By: _____

Corporate Secretary or other
person authorized to attest

Authorized Signer

Print Name

Print Name and Title

_____ day of _____, 20__

(CORPORATE SEAL OR NOTARY)

IN THE PRESENCE OF:

SURETY:

By _____

Signature

Agent and Attorney-in-Fact

(Print Name)

(Print/Type Name)

Address: _____

Signature

(Street)

(City/State/Zip Code)

(Print Name)

Telephone No.: _____



FORM 3: CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as Principal in the foregoing Performance and Payment Bonds; that _____, who signed the Bond(s) on behalf of the Principal, was then _____ of said corporation; that I know his/her signature; that his/her signature thereto is genuine; and that said Bond(s) was (were) duly signed, sealed and attested to on behalf of said corporation by authority of its governing body.

_____(Seal) as Secretary of

(Name of Corporation)

(SEAL)

STATE OF _____)
) SS.
COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20___, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____
Print Name: _____

(NOTARY SEAL)

My commission expires:



FORM 4: FORM OF CERTIFICATE AND AFFIDAVIT FOR BONDS \$500,000.00 OR LESS

TO: CITY OF COOPER CITY
RE: BID NUMBER: _____

BIDDER: _____

Name: _____

Address: _____

Phone: _____

AMOUNT OF BOND: _____

SURETY BOND COMPANY:

Name: _____

Address: _____

Phone: _____

This is to certify that, in accordance with Section 287.0935, Florida Statutes, the insurer named above:

- (1) Is licensed to do business in the State of Florida;
- (2) Holds a certificate of authority authorizing it to write surety bonds in the State of Florida;
- (3) Has twice the minimum surplus and capital required by the Florida Insurance Code;
- (4) Is otherwise in compliance with the provisions of the Florida Insurance Code; and
- (5) Currently holds a valid certificate of authority issued by the United States Department of Treasury under 31 U.S.C. §§ 9304-9308.

(Date Signed)

Agent and Attorney-in-Fact

(continued on next page)



AFFIDAVIT

STATE OF _____)
) SS.
COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20____, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:



**FORM 5: UNCONDITIONAL LETTER OF CREDIT
(PERFORMANCE AND PAYMENT GUARANTY) FORM**

UNCONDITIONAL LETTER OF CREDIT

Beneficiary:
City of Cooper City,
9090 SW 50th Place
Cooper City, FL 33328

Date of Issue _____
Issuing Bank's No. _____
Applicant: _____
Amount: _____
(in United States Funds)
Expiry: _____
(Date)
Bid/Contract Number _____

We hereby authorize you to draw on (Bank, Issuer Name) at (Branch Address) by order of and for the account of (Contractor, Applicant, Customer) up to an aggregate amount, in United States Funds, of \$(Dollar Amount) available by your drafts at sight, accompanied by: A signed statement from the City Manager of City of Cooper City, or the City Manager's authorized representative that the drawing is due to default in performance of certain obligations on the part of (Contractor, Applicant, Customer) agreed upon by and between City of Cooper City and (Contractor, Applicant, Customer) pursuant to the Bid/Contract No. for (Name of Project) and Section 255.05, Florida Statutes. Drafts must be drawn and negotiated not later than (expiration date). Drafts must bear the clause: "Drawn under Letter of Credit No. (number), of (Bank Name) dated _____."

This Letter of Credit shall be renewed for successive periods of one (1) year each unless we provide the City Manager of Cooper City with written notice of our intent to terminate the credit herein extended, which notice must be provided at least thirty (30) days prior to the expiration date of the original term hereof or any renewed one (1) year term. Notification to City of Cooper City that this Letter of Credit will expire prior to performance of Contractor's obligations will be deemed a default.

This Letter of Credit sets forth in full the terms of our undertaking, and such undertaking shall not in any way be modified or amplified by reference to any documents, instrument, or agreement referred to herein or in which this Letter of Credit is referred to or this Letter of Credit relates, and any such reference shall not be deemed to incorporate herein by reference any document, instrument, or agreement.

We hereby agree with the drawers, endorsers, and bona fide holders of all drafts drawn under and in compliance with the terms of this Letter of Credit that such drafts will be duly honored upon presentation to the drawee.

Obligations under this Letter of Credit shall be released one (1) year after the final completion of the Project by the _____ (Contractor, Applicant, Customer).



City of Cooper City, Florida
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This Credit is subject to the “Uniform Customs and Practice for Documentary Credits,” International Chamber of Commerce (2007 revision), Publication No. 600 and to the provisions of Florida law. If a conflict between the Uniform Customs and Practice for Documentary Credits and Florida law should arise, Florida law shall prevail. If a conflict between the law of another state or country and Florida law should arise, Florida law shall prevail.

Authorized Signature



FORM 6: MONTHLY (CBE/SBE) UTILIZATION REPORT
[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

MONTHLY (CBE) UTILIZATION REPORT

Report No. _____



Contract #:	Contract Amount:	Date Form Submitted:	
Project Description:		Project Completion Date:	
Prime Contractor:		Period Ending:	Amt. Paid to Prime:
Contact Person:		Telephone#: () ()	Fax#: () ()

SUBCONTRACTING INFORMATION

TO BE SUBMITTED TO BROWARD COUNTY OFFICE OF ECONOMIC AND SMALL BUSINESS DEVELOPMENT

CBE Subcontractor	Address	Description of Work	Original Agreed Price	Revised Agreed Price	% of work Completed to Date	Amount Paid This Period	Amount Paid To Date
Total Amount Paid to Subcontractors to Date:							

I certify that the information submitted in this report is in fact true and correct to the best of my knowledge

Signature: _____ **Title:** _____ **Date:** _____

Note: The information provided herein is subject to verification by the Office of Economic and Small Business Development.
 OESBD Compliance Form 2009-MUR



FORM 7: FINAL (CBE/SBE) UTILIZATION REPORT
[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

Report No. _____

FINAL (CBE) UTILIZATION REPORT



Contract #:	Contract Amount:	Date Form Submitted:	
Project Description:			
Project Completion Date:			
Prime Contractor:	Period Ending:	Amt. Paid to Prime:	
Contact Person:	Telephone#: () ()	Fax#: () ()	

SUBCONTRACTING INFORMATION

TO BE SUBMITTED TO BROWARD COUNTY OFFICE OF ECONOMIC AND SMALL BUSINESS DEVELOPMENT							
CBE Subcontractor	Address	Description of Work	Original Agreed Price	Revised Agreed Price	% of work Completed to Date	Amount Paid This Period	Amount Paid To Date

I certify that the information submitted in this report is in fact true and correct to the best of my knowledge

Signature:	Title:
	Date:

Note: The information provided herein is subject to verification by the Office of Economic and Small Business Development.

OESBD Compliance Form 2009-MUR-F



FORM 8A: STATEMENT OF COMPLIANCE (PREVAILING WAGE RATE)
[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

No. _____
Contract No. _____
Project Title _____

The undersigned Contractor hereby swears under penalty of perjury that, during the period covered by the application for payment to which this statement is attached, all mechanics, laborers, and apprentices, employed or working on the site of the Project, have been paid at wage rates, and that the wage rates of payments, contributions, or costs for fringe benefits have not been less than those required by Section 26-5 of the Broward County Code of Ordinances and the applicable conditions of the Contract.

Dated _____, 20__ _____
Contractor

By _____
(Signature)

By _____
(Name and Title)

STATE OF _____)
) SS.
COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20__, by _____, who is personally known to me or who has produced _____ as identification and [who did (did not)] take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:



FORM 8B: STATEMENT OF COMPLIANCE (DAVIS-BACON ACT)
[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

No. _____
Contract No. _____
Project Title _____

The undersigned Contractor hereby swears under penalty of perjury that, during the period covered by the application for payment to which this statement is attached, all mechanics, laborers, and apprentices, employed or working on the site of the Project, have been paid at wage rates, and that the wage rates of payments, contributions, or costs for fringe benefits have not been less than those required by the Davis-Bacon Act and the applicable conditions of the Contract.

Dated _____, 20__ _____
Contractor

By _____
(Signature)

By _____
(Name and Title)

STATE OF _____)
) SS.
COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20__, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:



FORM 9: CERTIFICATION OF PAYMENTS TO SUBCONTRACTORS

Contract No. _____
Project Title _____

The undersigned Contractor hereby swears under penalty of perjury that:

- 1. Contractor has paid all Subcontractors all undisputed contract obligations for labor, services, or materials provided on this Project within the time period set forth in Sections 218.73 and 218.735, Florida Statutes, as applicable.
- 2. The following Subcontractors have not been paid because of disputed contractual obligations; a copy of the notification sent to each, explaining the good cause why payment has not been made, is attached to this form:

Subcontractor Name and Address	Date of Disputed Invoice	Amount in Dispute

Dated _____, 20__ Contractor _____

By _____
(Signature)

By _____
(Name and Title)

STATE OF _____)
) SS.
COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20__, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:



FORM 10: CERTIFICATE OF SUBSTANTIAL COMPLETION

Contract No. _____
Project (Name and Address): _____
To City of Cooper City: _____
Consultant: _____
Contractor: _____
Notice to Proceed Date: _____
Date of Issuance: _____

Project or Designated Portion Shall Include:

The Work performed under this Contract has been reviewed and found to be substantially complete and all documents required to be submitted by Contractor under the Contract Documents have been received and accepted.

The date of Substantial Completion of the Project or portion thereof designated above is recommended as: _____

Unless otherwise defined in the contract, the definition of date of Substantial Completion is that date, as certified in writing by Consultant and as finally determined by Contract Administrator in its sole discretion, on which the Work, or a portion thereof, is at a level of completion in substantial compliance with the Contract Documents, such that all conditions of permits and regulatory agencies have been satisfied and the Owner or its designee can enjoy use or occupancy and can use or operate the Project in all respects for its intended purpose. A Certificate of Occupancy (or a Temporary Certificate of Occupancy or other alternate municipal/City authorization for limited or conditional occupancy acceptable to the Contract Administrator) must be issued for Substantial Completion to be achieved; however, the issuance of a Certificate of Occupancy or the date thereof does not constitute Substantial Completion.

A list of items to be completed or corrected that has been prepared by Consultant and approved by City of Cooper City is attached hereto. The failure to include any items on such list does not alter the responsibility of Contractor to complete all work in accordance with the Contract Documents.

Consultant By Date

In accordance with the terms of the Contract, Contractor will complete or correct the work on the list of items attached hereto within _____ from the above date of Substantial Completion.



City of Cooper City, Florida
ITB 2023-05-UTL, Effluent Pump #3 Replacement

Contractor

By

Date

City of Cooper City, through the Contract Administrator, has determined the Work or portion thereof designated by City of Cooper City is substantially complete and will assume full possession thereof at (time) _____ on _____ (date) _____.

CITY OF COOPER CITY:

By Contract Administrator

Date

The responsibilities of City of Cooper City and Contractor for security, maintenance, heat, utilities, damage to the work and insurance shall be as follows: _____



FORM 11: FINAL CERTIFICATE OF PAYMENT

Contract No. _____
Project (Name and Address): _____
To City of Cooper City: _____
Consultant: _____
Contractor: _____
Notice to Proceed Date: _____
Consultant: _____
Date of Issuance: _____

All conditions or requirements of any permits or regulatory agencies have been satisfied. The documents required pursuant to the terms and conditions of the Contract, and the final bill of materials, if required, have been received and accepted. The Work required by the Contract Documents has been reviewed and the undersigned certifies that the Work, including minor corrective work, has been completed in accordance with the provision of the Contract Documents and is accepted under the terms and conditions thereof.

Consultant By Date

City, through its Contract Administrator, accepts the Work as fully complete and will assume full possession thereof at _____ on _____.
(time) (date)

CITY OF COOPER CITY: _____
By Contract Administrator Date



FORM 12: FORM OF FINAL RECEIPT

[The following form will be used to show receipt of final payment for this Contract.]

FINAL RECEIPT FOR CONTRACT NO. _____

Received this _____ day of _____, 20____, from City of Cooper City, the sum of _____ Dollars (\$_____) as full and final payment to Contractor for all Work and materials for the Project described as:

This sum includes full and final payment for all extra Work and material and all incidentals.

Contractor hereby indemnifies and releases City of Cooper City from all liens and claims whatsoever arising out of the Contract and/or Project.

Contractor hereby certifies that all persons doing Work upon or furnishing materials or supplies for the Project have been paid in full. In lieu of this certification regarding payment for Work, materials and supplies, Contractor may submit a consent of surety to final payment in a form satisfactory to City.

Contractor further certifies that all taxes imposed by Chapter 212, Florida Statutes (Sales and Use Tax Act), as amended, have been paid and discharged.

[IF INCORPORATED SIGN BELOW.]

CONTRACTOR

ATTEST:

CONTRACTOR NAME

Corporate Secretary or other person authorized to attest

By: _____

Authorized Signer

(CORPORATE SEAL OR NOTARY)

Print Name and Title

_____ day of _____, 20____



[IF NOT INCORPORATED SIGN BELOW.]

CONTRACTOR

WITNESSES:

Witness signature

Print/Type Name

Witness signature

Print/Type Name

Business Name

By: _____
Authorized Signer

Print/Type Name and Title

_____ day of _____, 20__



FORM 13: FINAL LIST OF NON-CERTIFIED SUBCONTRACTORS AND SUPPLIERS
[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

To: _____, Contractor
From: City of Cooper City Purchasing Division
Subject: Final List of Non-certified Subcontractors/Sub-vendors
Re: _____
(Project Title, Contract Number)

The attached list of non-certified Subcontractors/sub-vendors have performed or provided services to City of Cooper City for the referenced contract. Non-certified Subcontractors/sub-vendors are any Subcontractors/sub-vendors whose services under the Contract were not approved to meet the City’s participation CBE/SBE goal established for this Contract, and whose participation was not listed on Contractor’s “Schedule of Participation” and/or not approved as substitutes or additions by the Broward County Office of Economic Small Business Development Division toward meeting the established goal.

Contractor certifies the following:

- There were no other non-certified Subcontractors/sub-vendors who provided a service to City of Cooper City for the referenced Contract. All participants on the Contract are listed on the attached list.
- There were other non-certified Subcontractors/sub-vendors who provided a service and are not listed on the attached list. The additional Subcontractors/sub-vendors are listed on the attached list.

THE UNDERSIGNED VENDOR HEREBY CERTIFIES THAT THE INFORMATION PROVIDED HEREIN IS TRUE AND CORRECT.

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20____, by _____, who is personally known to me or who has produced _____ as identification and (who did (did not)) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:



**FORM 14: LETTER OF INTENT (CBE/SBE)
To Utilize a County Business Enterprise (CBE) or Small Business Enterprise (SBE)
Subcontractor/Subconsultant**

[THIS FORM IS NOT APPLICABLE TO THIS PROJECT]

Project Name: «Project_Name»
Project Number: «Project_Number»

From (Name of Proposer/Bidder): _____

Firm Address: _____

Project Description: _____

In response to City of Cooper City's RFP/Bid No. _____, the undersigned hereby agree to utilize the CBE or SBE firm listed below, if awarded the contract. The undersigned further certify that the firm has been contacted and properly apprised of the projected work assignment(s) upon execution of the contract with City of Cooper City.

Name _____ of _____ CBE/SBE Firm: _____

Address of CBE/SBE Firm: _____

Expiration of CBE/SBE Certification: _____ Projected CBE/SBE Work Assignment (description of work assignment): _____

Projected Percentage of Prime's Contract Fees to be Awarded to CBE/SBE (Percentage %): _____

(Signature of Owner or Authorized Rep. **Prime**) (Date)

Print Name (owner or authorized Rep. **Prime**): _____

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20____, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)



My commission expires:

(ACKNOWLEDGEMENT BY THE PROPOSED CBE/SBE FIRM)

The undersigned intends to perform Work in connection with the above Contract as (check one): an individual a partnership a corporation a joint venture. The undersigned agrees with the prime contractor's/consultant's proposal and further certifies that all information provided herein is true and correct.

(Signature of Owner or Authorized Rep. **CBE/SBE**)

(Date)

Print Name (owner or authorized Rep. **CBE/SBE**): _____

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20____, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:

Signature: _____

Print Name: _____

(NOTARY SEAL)

My commission expires:

[END OF SECTION]

COOPER CITY WASTEWATER TREATMENT PLANT EFFLUENT PUMP REPLACEMENT 11791 SW 49th STREET

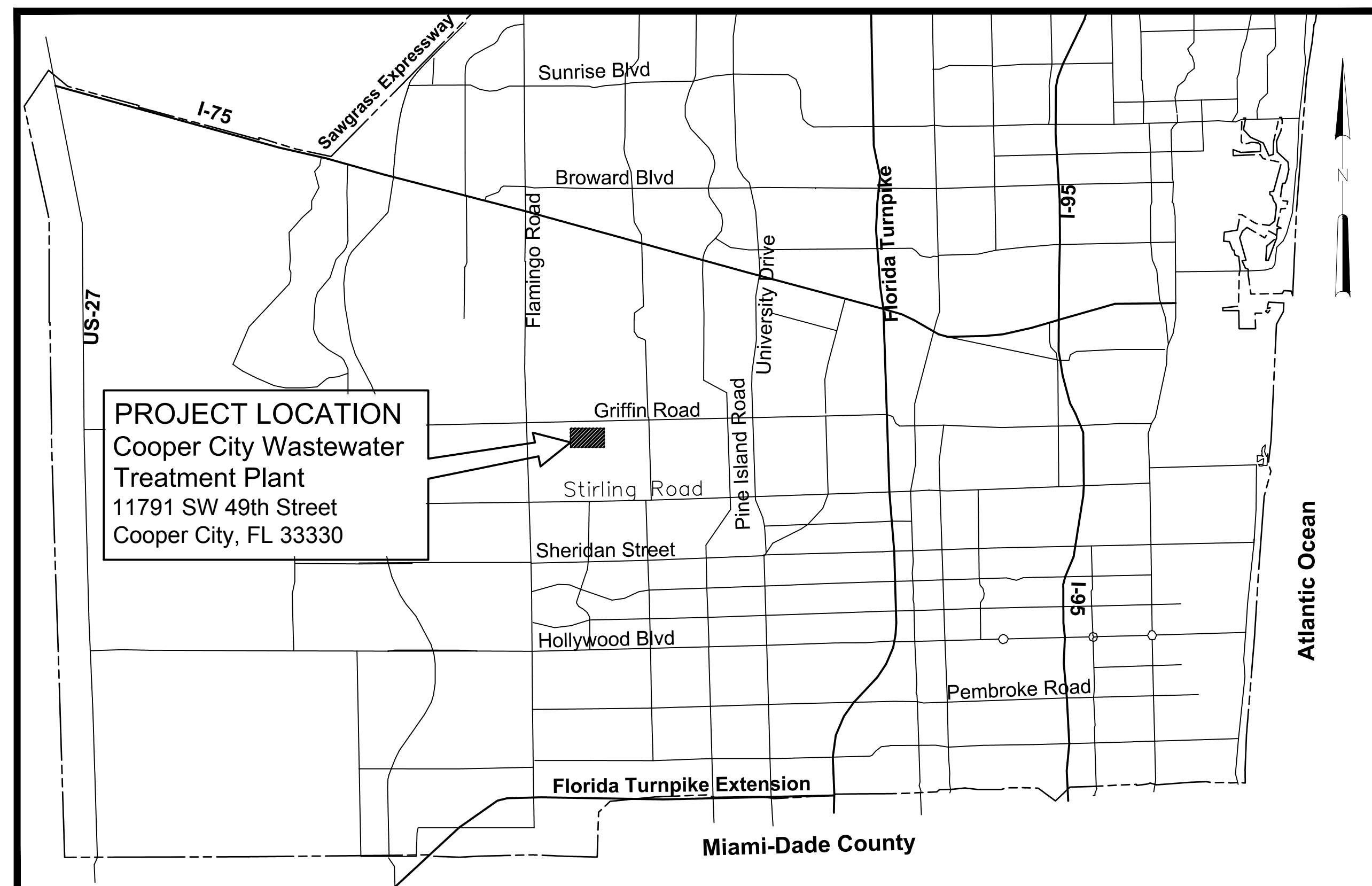
PREPARED FOR THE
COOPER CITY UTILITIES DEPARTMENT

**BID SET
MAY 2023**

LIST OF DRAWINGS

SHEET NUMBER	SHEET TITLE	SHEET DESCRIPTION
GENERAL		
1	G-01	COVER SHEET, LOCATION MAP AND LIST OF DRAWINGS
2	G-02	ABBREVIATIONS, SYMBOLS AND LEGEND
3	G-03	GENERAL NOTES
4	G-04	STAGING PLAN
CIVIL		
5	C-01	EXISTING SITE PLAN
6	C-02	PROPOSED SITE PLAN
MECHANICAL		
7	M-01	EXISTING PLAN AND SECTION
8	M-02	PROPOSED PLAN AND SECTION
9	M-03	MECHANICAL SECTIONS AND DETAILS
STRUCTURAL		
10	S-01	ELECTRICAL CONDUIT SUPPORT PLAN AND SECTIONS
11	S-02	SECTION AND DETAILS
12	S-03	ELECTRICAL BUILDING
ELECTRICAL		
13	E-01	LEGEND, SYMBOL AND ABBREVIATIONS
14	E-02	GENERAL ELECTRICAL NOTES
15	E-03	EXISTING SINGLE LINE DIAGRAM & RISER DIAGRAMS
16	E-04	PROPOSED SINGLE LINE DIAGRAM
17	E-05	OVERALL ELECTRICAL SITE PLAN
18	E-06	ENLARGED ELECTRICAL SITE PLAN
19	E-07	MCC ROOM DEMOLITION AND PROPOSED VIEWS
20	E-08	DEMOLITION PHOTOS
21	E-09	EFFLUENT PUMP NO.3 CONTROL RISER
22	E-10	ELECTRICAL DETAILS - SHEET 1

Hazen
HAZEN AND SAWYER
4000 HOLLYWOOD BOULEVARD, SUITE 750N
HOLLYWOOD, FLORIDA 33021



LOCATION MAP

NTS

Call 48 hours
before you dig

It's the Law!
1-800-432-4770



Sunshine State One Call of Florida, Inc.

DATE: MAY 2023

SHEET: 1 OF 22

DRAWING: G-01

COVER SHEET, LOCATION MAP AND LIST OF
DRAWINGS

SYMBOLS

ABBREVIATIONS

	VENTURI METER
	GAUGE
	SOLENOID
	MOTOR OPERATED
	MAGNETIC METER
	PROPOSED PIPELINE/STRUCTURE
	EXISTING UTILITIES/STRUCTURE
	PROPOSED PIPELINE (DOUBLE LINE IF SCALE OF DRAWING PERMITS)
	PROPOSED STRUCTURE OR FACILITY
	REDUCER (SINGLE LINE)
	REDUCER (DOUBLE LINE)
	CONCRETE PIPE SUPPORT
	BALL VALVE
	BUTTERFLY VALVE / DAMPER
	CHECK BALL VALVE
	CHECK VALVE
	GATE VALVE
	PLUG VALVE
	THREE WAY VALVE
	PRESSURE REDUCING/RELIEF VALVE
	PRESSURE REGULATING VALVE
	HOSE BIBB (PLAN)
	HOSE BIBB (ELEVATION)
	MECHANICAL COUPLING
	HARNESSED MECHANICAL COUPLING
	GROOVED COUPLING
	HARNESSED EXPANSION JOINT
	EXPANSION JOINT
	UNION
	FIRE HYDRANT
	MAINTENANCE HOLE
	POWER POLE
	SEALED MAINTENANCE HOLE
	CATCH BASIN
	FENCE
	WELDED JOINT
	FLANGED JOINT
	MECHANICAL JOINT
	PUSH-ON JOINT
	THREADED JOINT
	SOCKET WELDED JOINT

VALVES, FITTINGS, ETC.

ARV	AIR RELIEF VALVE
BA V	BALL VALVE
BF	BLIND FLANGE
BF V	BUTTERFLY VALVE
CV	CHECK VALVE
CPLG	COUPLING
ED	EQUIPMENT DRAIN
EXP JT	EXPANSION JOINT
FH	FIRE HYDRANT
FTG	FITTING
FLG	FLANGE
FD	FLOOR DRAIN
GC	GROOVED COUPLING
GV	GATE VALVE
HB	HOSE BIBB
MJ	MECHANICAL JOINT
MOV	MOTOR OPERATED VALVE
NPT	NATIONAL PIPE THREAD
PE	PLAIN END
PV	PLUG VALVE
PRV	PRESSURE RELIEF VALVE
PS	PUMP STATION
RD	ROOF DRAIN
SOV	SOLENOID OPERATED VALVE
THD	THREADED

PIPING

CIP	CAST IRON PIPE
DIP	DUCTILE IRON PIPE
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE
FM	FORCE MAIN
FRP	FIBERGLASS REINFORCED PIPE
GSP	GALVANIZED STEEL PIPE
RCP	REINFORCED CONCRETE PIPE
SSP	STAINLESS STEEL PIPE
IPS	IRON PIPE SIZE
PVC	POLYVINYLCHLORIDE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE

GENERAL

AA	AERATION AIR
A/C	AIR CONDITIONER
AL, ALUM	ALUMINUM
AB	ANCHOR BOLT
∠	ANGLE
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
BLK	BLOCK

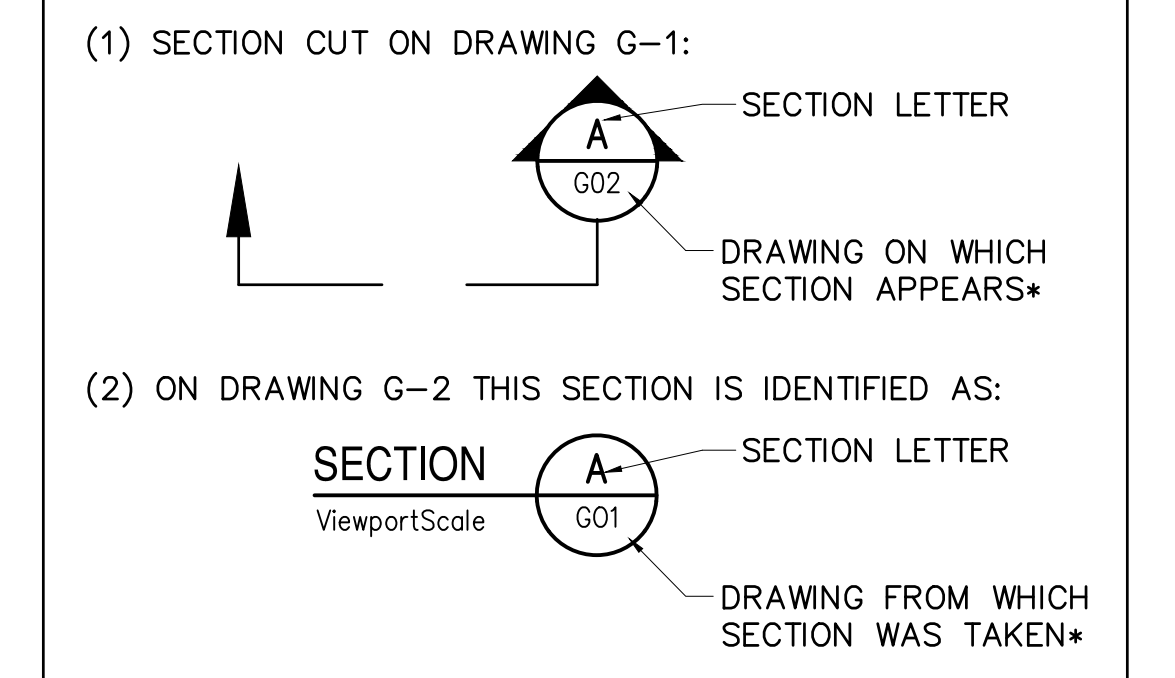
BLDG	BUILDING
BOTT	BOTTOM
BP	BID PACKAGE
CB	CATCH BASIN
CC	CENTER TO CENTER
CHK'D	CHECKERED
CHLOR, CL ₂	CHLORINE
CL, CL	CENTER LINE
CLR	CLEAR
CL ₂ S	CHLORINE SOLUTION
CL ₂ G	CHLORINE GAS
CL ₂ V	CHLORINE GAS UNDER VACCUUM
CO	COMPANY
CO	CLEAN OUT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CU	COPPER OR CUBIC
DEC	DECANT
DET	DETAIL
DIAG	DIAGONAL
DIA	DIAMETER
DIM	DIMENSION
DISCH	DISCHARGE
DN	DOWN
DR	DRAINS
DWG(S)	DRAWING(S)
DWL	DOWEL
EA	EACH
ECC	ECCENTRIC
EE	EACH END
EF	EACH FACE
EFF	EFFLUENT
ELEC	ELECTRIC
EL, ELEV	ELEVATION
EMH	ELECTRICAL MAINTENANCE HOLE
EOP	EDGE OF PAVEMENT
EQUIP	EQUIPMENT
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION
EXH	EXHAUST
EXT	EXTERIOR
FA	FOUL AIR
FE	FIRE EXTINGUISHER
FIG	FIGURE
FIN	FINISH

FL	FLOOR
FM	FORCE MAIN
FPL, FP & L	FLORIDA POWER AND LIGHT CO.
FTG	FOOTING
G	GRIT
GALV	GALVANIZED
GR	GRADE
H	HIGH
HDPE	HIGH DENSITY POLYETHYLENE
HORIZ	HORIZONTAL
HP	HIGH POINT
HR	HANDRAIL
HWL	HIGH WATER LEVEL
IE	INVERT ELEVATION
INFL	INFLUENT
INJ	INJECTION
ID	INSIDE DIAMETER
IF	INSIDE FACE
INSUL	INSULATION
INT	INTERIOR
ISO	ISOLATION
IQ	IRRIGATION QUALITY
INV	INVERT
JT	JOINT
LF	LINEAL FEET
LG	LONG
LN	LINE
LP	LOW POINT
LR	LONG RADIUS
LWL	LOW WATER LEVEL
MH	MAINTENANCE HOLE/MANHOLE
MANUF	MANUFACTURER
MO	MASONRY OPENING
MAX	MAXIMUM
MECH	MECHANICAL
ML	MIXED LIQUOR
MIN	MINIMUM
MWD	MUD WELL DISCHARGE
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
No	NUMBER
OC	ON CENTER
OHW	OVERHEAD WIRE
OPNG	OPENING
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
PE	PLAIN END
PI	PLANT INFLUENT

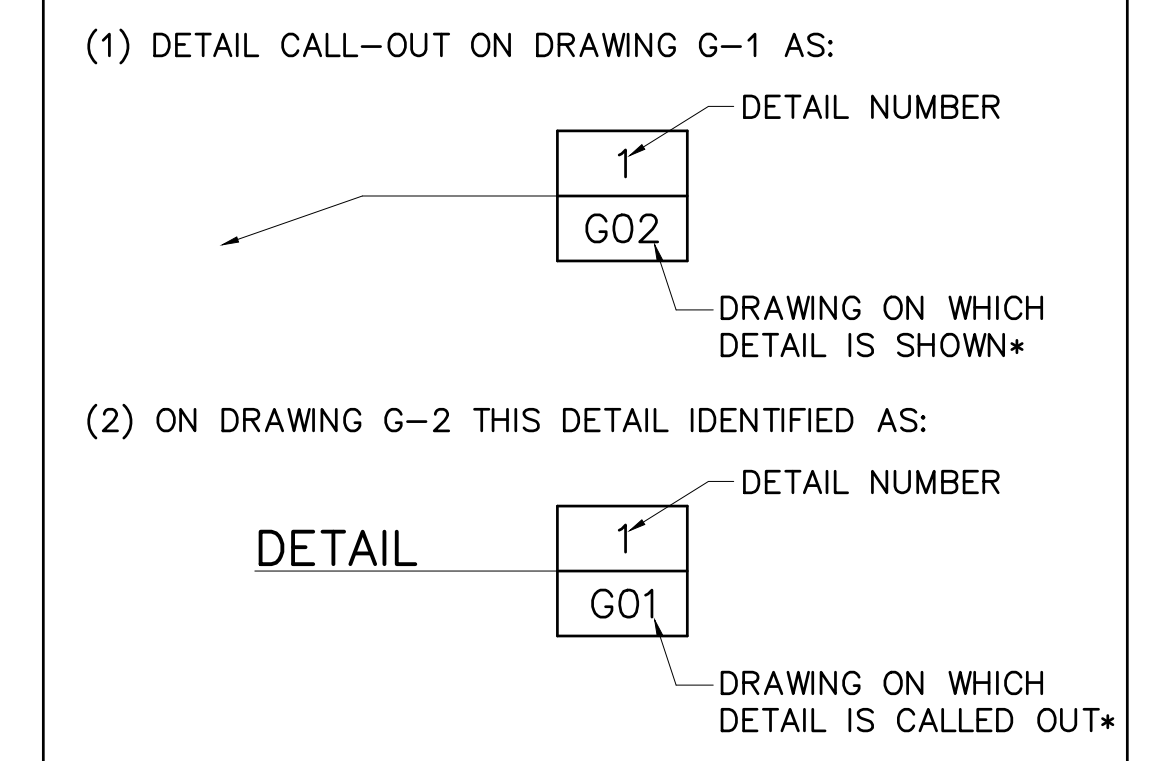
PD	PLANT DRAIN
PO	POND OVERFLOW
PW	POTABLE WATER
POT	POTABLE
PS	PUMP STATION
LBS/FT	POUNDS PER FOOT
P/L	PROPERTY LINE
RAD, R	RADIUS
RAS	RETURN ACTIVATED SLUDGE
RECIR	RECIRCULATION
RED	REDUCING
REHAB	REHABILITATION
REINF	REINFORCING
REQ'D	REQUIRED
R/W, ROW	RIGHT OF WAY
RW	REUSE WATER
SAN	SANITARY
SC	SCUM
SE	SECONDARY EFFLUENT
SECT	SECTION
SHT	SHEET
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STL	STEEL
STRUC	STRUCTURAL
SPD	SUMP PUMP DISCHARGE
SYMM	SYMMETRICAL
TI	TEMPERATURE INDICATOR
TEMP	TEMPORARY
THK	THICK
TO	TANK OVERFLOW
TO	THROUGHOUT
T & B	TOP AND BOTTOM
TOC	TOP OF CONCRETE
TOS	TOP OF STEEL/TOP OF SLAB
TYP	TYPICAL
UGC	UNDERGROUND CONDUIT
VAC	VACUUM
VERT	VERTICAL
VTR	VENT THROUGH ROOF
WAS	WASTE ACTIVATED SLUDGE
WF	WOOD FENCE
WTR	WATER
W/L	WATER LEVEL
WWF	WELDED WIRE FABRIC
W	WIDE
W/	WITH
W/O	WITHOUT

SECTION AND DETAIL IDENTIFICATION

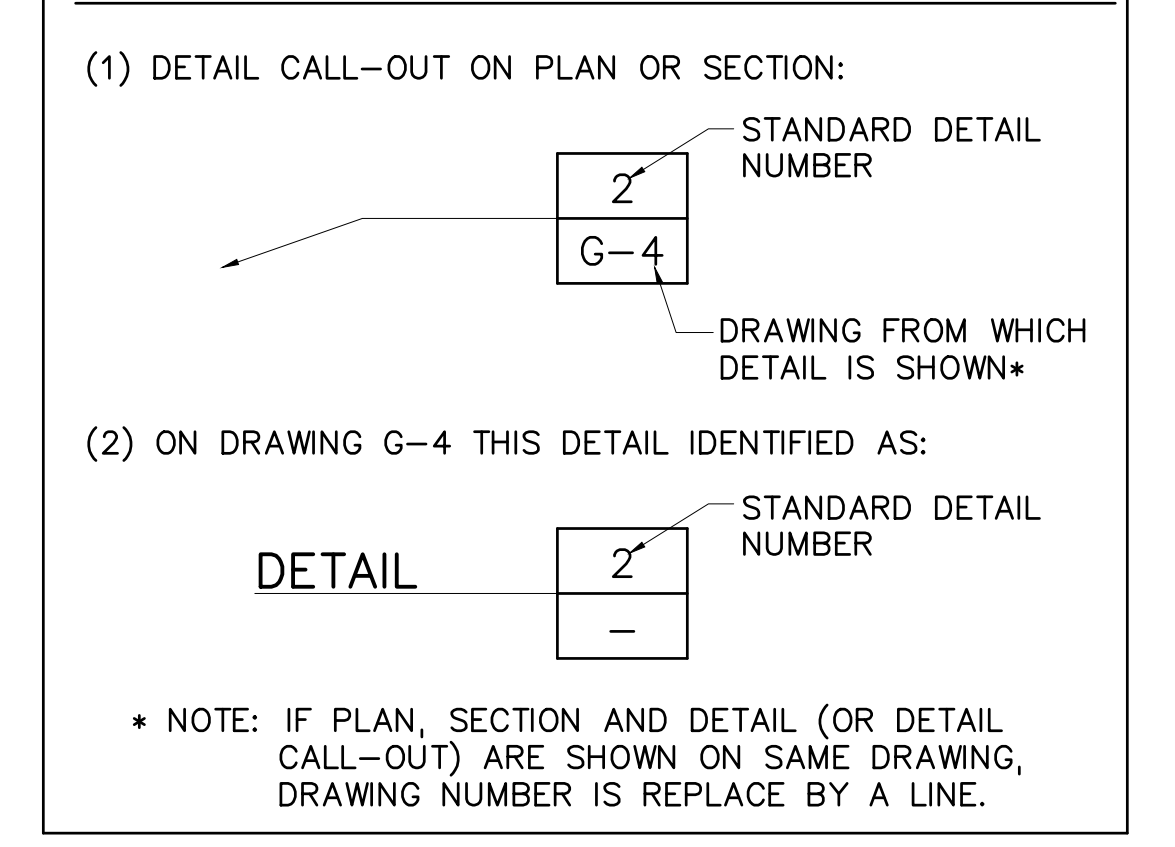
SECTION IDENTIFICATION



DETAIL IDENTIFICATION



STANDARD DETAIL IDENTIFICATION



NOTES:
 (1) ELECTRICAL SYMBOLS SHOWN ON ELECTRICAL SHEETS.
 (2) FOR WELDING SYMBOLS USE AMERICAN WELDING SOCIETY STANDARD SYMBOLS. SEE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL.

File: C:\Users\jg001\OneDrive\Documents\4679-004\G02.dwg
 Plot Date: 2023/05/05 11:42:46 AM
 Plot By: ESS010
 Scale: AS NOTED
 Client Project: -
 Engineer Project: 4679-004
 CAD Reference: 4679-004-G02.dwg
 Date: MAY 2023
 Sheet: 2 OF 22
 Drawing: G-02

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW

BY	GAB
BY	GAB
BY	GAB
ISSUED FOR	

Hazen
 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE	AS NOTED
CLIENTS PROJECT:	-
ENGINEERS PROJECT:	4679-004
CAD REFERENCE:	4679-004-G02.dwg

COOPER CITY
 CITY OF Cooper City
 Someplace Special

COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
ABBREVIATIONS, SYMBOLS AND LEGEND

DATE:	MAY 2023
SHEET:	2 OF 22
DRAWING:	G-02

BID SET

GENERAL NOTES

- CONTRACTOR SHALL MAINTAIN ACCESS TO PRIVATE PROPERTY AT ALL TIMES.
- CONTRACTOR SHALL MAINTAIN HIS WORK WITHIN THE LIMITS SHOWN ON THE STAGING PLAN.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT EXISTING PIPELINES OR UTILITIES WHETHER SHOWN OR NOT.
- THE CONTRACTOR SHALL ENSURE THAT ALL NECESSARY PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.
- PROTECT EXISTING TREES AND SHRUBS FROM DAMAGE. DO NOT REMOVE EXISTING TREES AND SHRUBS UNLESS SHOWN OTHERWISE ON THE LANDSCAPE DRAWINGS.
- THE LOCATION OF EXISTING UTILITIES HAS BEEN PREPARED FROM THE MOST RELIABLE INFORMATION AVAILABLE TO THE ENGINEER. THE INFORMATION IS NOT GUARANTEED. THEREFORE THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES IN THE FIELD PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES IN THE AREA 48 HOURS MINIMUM PRIOR TO START OF CONSTRUCTION, AND SHALL HAVE ALL SERVICE LINES (FPL, WATER, CABLE, TELEPHONE, SANITARY SEWER, IRRIGATION, FORCE MAIN AND OTHERS) LOCATED AND FLAGGED PRIOR TO ANY EXCAVATION.
- THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL UTILITY LINES AND SERVICES DAMAGED DURING CONSTRUCTION, INCLUDING IRRIGATION LINES AND SERVICES. THE APPROPRIATE UTILITY SHALL BE NOTIFIED OF ALL DAMAGED LINES PRIOR TO REPAIR. ALL NECESSARY REPAIRS SHALL BE PERFORMED IMMEDIATELY UPON DAMAGE TO THE LINE.
- ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
- THE CONTRACTOR IS REQUIRED TO OBTAIN WRITTEN APPROVAL FROM THE ENGINEER FOR ANY DEVIATIONS FROM THE PLANS AND/OR SPECIFICATIONS.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY REQUIRED PLAN DEVIATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A DEWATERING PERMIT FROM THE SOUTH FLORIDA MANAGEMENT DISTRICT IF NECESSARY.
- CONTRACTOR SHALL PROVIDE A MINIMUM VERTICAL CLEARANCE OF 18" BETWEEN ALL UTILITY LINES THAT CROSS.
- RESTRAINED JOINT PIPE SHALL BE USED FOR ALL PIPING ON THIS PROJECT. THRUST BLOCKS WILL NOT BE ALLOWED.
- ALL CONNECTIONS TO EXISTING MAINS SHALL BE MADE UNDER THE DIRECTION OF THE CITY OF COOPER CITY.
- THE MINIMUM DEPTH OF COVER OVER WATER MAINS IS 36" EXCEPT WHERE SHOWN DIFFERENTLY ON PLANS.
- DISINFECTION OF MAINS SHALL COMPLY WITH A.N.S.I./A.W.W.A. C-651(LATEST REVISION) STANDARD. BACTERIOLOGICAL SAMPLING POINTS SHALL BE DESIGNATED ON THE ENGINEERING PLANS. MINIMUM ONE SAMPLING POINT AT EACH END.
- THERE SHALL BE NO CONNECTION TO AN EXISTING WATER MAIN UNTIL PRESSURE AND BACTERIOLOGICAL TESTS HAVE BEEN CONDUCTED AND THE RESULTS ARE APPROVED AND ACCEPTED BY THE BROWARD COUNTY HEALTH DEPARTMENT.
- PIPE DEFLECTION SHALL NOT EXCEED 75% OF THE MAXIMUM DEFLECTION RECOMMENDED BY THE MANUFACTURER.
- CONTRACTOR SHALL COMPLY WITH ALL LOCAL CITY, COUNTY AND STATE REGULATIONS PERTAINING TO THE CLOSING OF PUBLIC STREETS FOR USE OF TRAFFIC DURING CONSTRUCTION.
- ALL OPEN TRENCHES AND HOLES ADJACENT TO ROADWAY OR WALKWAY SHALL BE PROPERLY MARKED AND BARRICADED TO ASSURE THE SAFETY OF BOTH VEHICULAR AND PEDESTRIAN TRAFFIC.
- TRENCHES OR HOLES NEAR WALKWAYS, IN ROADWAYS OR THEIR SHOULDERS SHALL NOT BE LEFT OPEN DURING NIGHT TIME HOURS WITHOUT ADEQUATE PROTECTION.
- CONTRACTOR SHALL PROMPTLY REPAIR AND RESTORE EXISTING PAVEMENT, SIDEWALKS, CURBS, DRIVEWAYS, PIPES, RESIDENTIAL AND COMMERCIAL SPRINKLER LINES, CONDUIT, CABLES, ETC. AND LANDSCAPE AREAS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AS REQUIRED BY AGENCIES HAVING JURISDICTION OVER THE PROJECT AND/OR WHEN REQUIRED FOR PUBLIC SAFETY.
- THE CONTRACTOR SHALL BE RESPONSIBLE AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION AND UNTIL ACCEPTANCE OF WORK, FOR THE PROTECTION OF EXISTING AND NEWLY INSTALLED UTILITIES FROM DAMAGE OR DISRUPTION OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING SUCH MEASURES AS NECESSARY TO PROTECT THE HEALTH, SAFETY AND WELFARE OF THOSE PERSONS HAVING ACCESS TO THE WORK SITE.
- CONTRACTOR SHALL ADJUST TO FINAL GRADE ALL EXISTING UTILITY CASTINGS INCLUDED VALVE BOXES, MANHOLES, HAND HOLES, PULL BOXES, INLETS AND SIMILAR STRUCTURES IN CONSTRUCTION AREA TO BE OVERLAID WITH ASPHALT.

EROSION AND SEDIMENT CONTROL NOTES

- CONTRACTOR TO EMPLOY BEST MANAGEMENT PRACTICES THROUGHOUT CONSTRUCTION IN ORDER TO ENSURE POLLUTION PREVENTION. CONTRACTOR TO COMPLY WITH ALL LOCAL STATE AND OTHER GOVERNMENTAL ENVIRONMENTAL REGULATIONS THROUGHOUT CONSTRUCTION.
- DURING CONSTRUCTION ALL CATCH BASIN INLETS SHALL BE PROTECTED TO PREVENT SEDIMENT AND DEBRIS FROM ENTERING THE CATCH BASIN.
- SILT FENCES SHALL BE INSTALLED AS NECESSARY TO CONTROL OR PREVENT DISCHARGE OF SEDIMENT ONTO ADJACENT UNDISTURBED AREAS, OR OFF-SITE AREAS.
- ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE STABILIZED WITHIN A REASONABLE PERIOD OF TIME TO ASSURE MINIMUM EROSION OF SOILS.
- NO LAND CLEARING OR GRADING SHALL BEGIN UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
- ALL EXPOSED AREAS SHALL BE SODDED AS SPECIFIED WITHIN 30 DAYS OF FINAL GRADING.
- MAINTAIN EROSION CONTROL MEASURES AFTER EACH RAIN AND AT LEAST ONCE A WEEK.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SOIL SEDIMENT FROM LEAVING THE SITE.
- CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL ORDINANCES THAT APPLY.
- ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED IF DEEMED NECESSARY BY CITY, COUNTY, AND STATE OF FLORIDA ON SITE INSPECTION, AT NO ADDITIONAL COST TO THE OWNER.
- LAND DISTURBING ACTIVITIES SHALL NOT COMMENCE UNTIL APPROVAL TO DO SO HAS BEEN RECEIVED BY GOVERNING AUTHORITIES.
- IF INSTALLATION OF STORM DRAINAGE SYSTEM SHOULD BE INTERRUPTED BY WEATHER OR NIGHTFALL, THE PIPE ENDS SHALL BE COVERED WITH FILTER FABRIC.
- BURNING OF DEBRIS WILL NOT BE ALLOWED.
- CONTRACTOR SHALL BE RESPONSIBLE TO TAKE WHATEVER MEANS NECESSARY TO ESTABLISH PERMANENT SOIL STABILIZATION.
- CONTRACTOR IS TO PROVIDE EROSION CONTROL/SEDIMENTATION BARRIER (HAY BALES OR SILTATION CURTAIN) TO PREVENT SILTATION OF ADJACENT PROPERTY, STREETS, STORM SEWERS AND WATER WAYS. IN ADDITION CONTRACTOR SHALL PLACE STRAW, MULCH OR OTHER SUITABLE MATERIAL ON GROUND IN AREAS WHERE CONSTRUCTION RELATED TRAFFIC IS TO ENTER AND EXIT SITE IF IN THE OPINION OF THE ENGINEER AND/OR LOCAL AUTHORITIES IF EXCESSIVE QUANTITIES OF EARTH ARE TRANSPORTED OFF-SITE EITHER BY NATURAL DRAINAGE OR BY VEHICULAR TRAFFIC. THE CONTRACTOR IS TO REMOVE AND CLEAN SAID EARTH TO THE SATISFACTION OF THE ENGINEER AND/OR AUTHORITIES. EROSION CONTROL BARRIER SHALL BE ESTABLISHED AS THE FIRST ITEM OF WORK.
- THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S STORMWATER PERMITTING PROGRAM APPLIES TO ALL CONSTRUCTION ACTIVITY THAT: 1) CONTRIBUTE STORMWATER DISCHARGES TO SURFACE WATER OF THE STATE OR INTO A MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4); 2) DISTURBS ONE OR MORE ACRES OF LAND; OR 3) LESS THAN ONE ACRE IS INCLUDED IF THE ACTIVITY IS PART OF A LARGER COMMON PLAN OF DEVELOPMENT THAT WILL MEET OR EXCEED THE ONCE ACRE THRESHOLD. DISTURB INCLUDES CLEARING, GRADING AND EXCAVATING.
- FOR CONSTRUCTION ACTIVITY THAT IS SUBJECT TO THE NPDES FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S STORMWATER PERMITTING PROGRAM, THE CONTRACTOR SHALL:
 - OBTAIN A GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION DOCUMENT 62-621.300(4)(A).
 - COMPLY WITH ALL REQUIREMENTS OF THE GENERIC PERMIT.
 - DEVELOP AND IMPLEMENT A STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
 - COMPLETE A NOTICE OF INTENT (NOI) FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION FORM 62-621.300(4)(B) IN ITS ENTIRETY USING THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S WEBSITE.
- SUBMIT COPIES OF THE SWPPP AND THE NOI TO THE ENGINEER AS INFORMATIONAL RECORDS. THESE SUBMITTALS WILL NOT BE REVIEWED BY THE ENGINEER.
- CONTRACTOR TO CLEAN AND REPAIR ALL EXISTING STORMWATER INFRASTRUCTURE THAT IS IMPACTED BY CONSTRUCTION ACTIVITIES, BEFORE LEAVING THE JOBSITE.
- CONTRACTOR TO REMOVE ALL FILTER FABRIC AND POLLUTION PREVENTION ITEMS BEFORE THE FINAL WALK-THROUGH.

PROJECT SCOPE NARRATIVE

- THIS PROJECT IS LOCATED AT THE CITY OF COOPER CITY WASTEWATER TREATMENT PLANT.
- THIS PROJECT WILL INSTALL A NEW 250-HORSEPOWER VERTICAL TURBINE PUMP AT THE EXISTING EFFLUENT PUMP STATION.
- THE PROPOSED PUMP IS REPLACING AN EXISTING 100-HORSEPOWER PUMP THAT WAS PREVIOUSLY REMOVED BY THE CITY.
- THIS PROJECT ALSO INCLUDES INSTALLATION OF A VARIABLE FREQUENCY DRIVE THAT WILL CONTROL THE PUMP SPEED.
- THE CONTRACTOR SHALL FURNISH ALL NECESSARY LABOR, EQUIPMENT AND MATERIALS FOR A COMPLETE AND OPERABLE SYSTEM.

FLOOD HAZARD DOCUMENTATION

PARAMETER	VALUE	NOTES
FEMA FLOOD MAP	12011C0545H	
FEMA BASE (100-YEAR) FLOOD ELEVATION	NOT APPLICABLE	SITE IS NOT WITHIN 100-YEAR FLOOD ZONE
FLOOD ZONE	ZONE X (UNSHADED)	AREA OF MINIMAL FLOOD HAZARD
IS PROJECT SITE HIGHER THAN THE 100-YEAR FLOOD ELEVATION?	YES	-
IS PROJECT SITE HIGHER THAN THE 500-YEAR FLOOD PLAIN?	YES	-
BASE FLOOD ELEVATION, BFE (NAVD1988):	6.00	NEAREST 100-YR FLOOD ELEVATION TO THE PROJECT SITE ON FIRM MAP (NAVD1988)
FLOOD DESIGN CLASS	3	ASCE 24-14 TABLE 1-1
CROWN OF ROAD ELEVATION ADJACENT TO PROJECT SITE (NAVD1988)	7.00	SW 49TH STREET
EFFLUENT PUMP STATION SLAB ON GRADE TOP EL. (NGVD1929) SLAB ON GRADE TOP EL. (NAVD1988)	12.00 10.39	PUMP STATION SLAB ELEVATION IS APPROX. 3 FT ABOVE ROAD CROWN
MINIMUM FINISHED FLOOR EL. CRITERION REQUIRED VALUE (NAVD1988) DESIGN VALUE (NAVD1988) COMPLIES	BFE+1 7.00 10.39 YES	ASCE 24-14 TABLE 2-1
MINIMUM EQUIPMENT EL. CRITERION REQUIRED VALUE (NAVD1988) DESIGN VALUE (NAVD1988) COMPLIES	BFE+1 7.00 10.39 YES	ASCE 24-14 TABLE 7-1
ASCE 24-14: AMERICAN SOCIETY OF CIVIL ENGINEERS STANDARD TITLED "FLOOD RESISTANT DESIGN AND CONSTRUCTION".		
NAVD: NORTH AMERICAN VERTICAL DATUM.		
NGVD: NATIONAL GEODETIC VERTICAL DATUM.		
BFE: BASE FLOOD ELEVATION.		

File: C:\Users\j001\OneDrive\Documents\4679-004\G03.dwg User: j001 Date: 2023/05/05 11:19 AM
 Plot Date: 2023/05/05 11:42:50 AM By: E55010

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW

GEORGE A. BROWN P.E.
 No. 56076



HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE: AS NOTED
 CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-G03.dwg

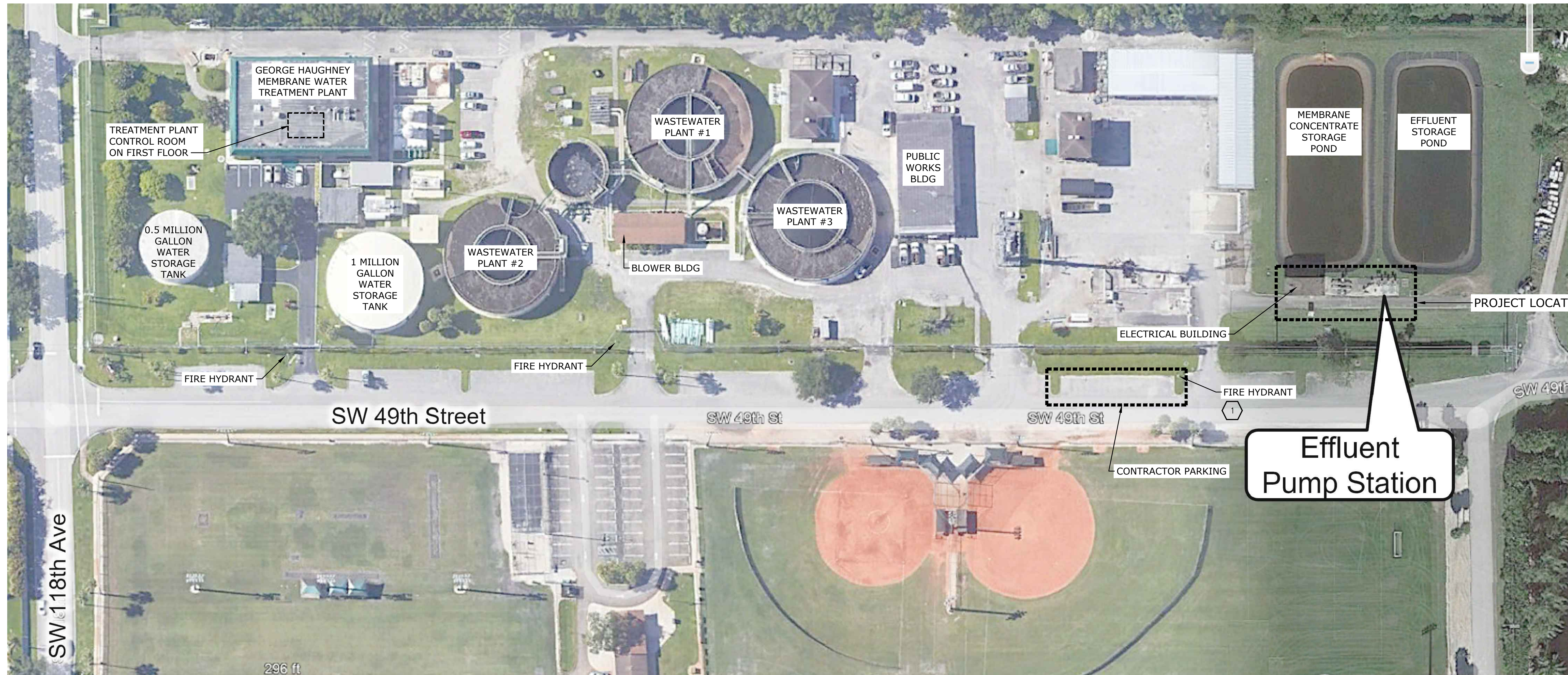


COOPER CITY
 CITY OF Cooper City
 Someplace Special

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
 GENERAL NOTES

DATE: MAY 2023
 SHEET: 3 OF 22
 DRAWING: G-03

BID SET



BROWARD COUNTY DEVELOPMENT AND ENVIRONMENTAL REVIEW NOTES:

1. THE CONTRACTOR SHALL COMPLETE ONLINE APPLICATION FORMS TO RECEIVE BROWARD COUNTY DEVELOPMENT & ENVIRONMENTAL REVIEW APPROVALS.
2. BROWARD COUNTY DEVELOPMENT & ENVIRONMENTAL REVIEW MUST BE COMPLETED ENTIRELY ONLINE THROUGH BROWARD COUNTY'S EPERMITS SYSTEM AT WWW.BROWARD.ORG/EPERMITTS.
3. PAPER PLAN SUBMITTALS ARE NOT ACCEPTED BY BROWARD COUNTY.
4. THE CONTRACTOR SHALL PAY ALL REQUIRED IMPACT AND REVIEW FEES.
5. APPROVED PLANS BECOME INVALID IF NOT SUBMITTED TO THE RELEVANT BUILDING DEPARTMENT WITHIN THIRTY DAYS.

WELLFIELD PROTECTION ZONE NOTES:

1. THE PROJECT IS LOCATED WITHIN WELLFIELD PROTECTION ZONE 3 AS INDICATED IN THE BROWARD COUNTY WELLFIELD PROTECTION ZONE MAP.
2. PROJECTS IN A PROTECTED WELLFIELD ZONE MAY REQUIRE A LICENSE ISSUED BY THE BROWARD COUNTY CONSUMER PROTECTION DIVISION (CPD). IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE CPD AND OBTAIN A LICENSE IF IT IS REQUIRED.
3. DEVELOPMENT & ENVIRONMENTAL REVIEW APPROVAL WILL NOT BE GRANTED UNTIL A COMPLETE APPLICATION FOR A WELLFIELD PROTECTION LICENSE HAS BEEN RECEIVED BY CPD.

STAGING AREA NOTES:

1. CONTRACTOR SHALL ENSURE THAT ITS ACTIVITIES DO NOT BLOCK TREATMENT PLANT ACCESS. OBTAIN PRIOR WRITTEN APPROVAL BY THE CITY BEFORE RESTRICTING OR BLOCKING ACCESS.
2. THE CITY WILL PROVIDE A TEMPORARY STAGING AREA FOR EQUIPMENT STORAGE WITHIN THE WASTEWATER TREATMENT PLANT FOR THE CONTRACTOR'S USE. THE CONTRACTOR SHALL RESTORE THE AREA PRIOR TO FINAL COMPLETION.

KEYED NOTE:

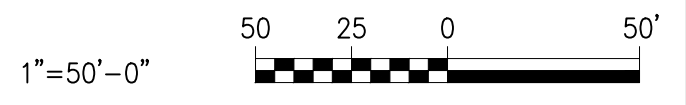
- 1 THE CONTRACTOR CAN USE THIS EXISTING FIRE HYDRANT FOR TEMPORARY WATER IF NEEDED. THE CONTRACTOR SHALL INSTALL AN RPZ TYPE BACKFLOW PREVENTER. OBTAIN TEMPORARY WATER METER IF REQUIRED BY THE CITY OF COOPER CITY.

PROPERTY ADDRESS:
 CITY OF COOPER CITY
 WASTEWATER TREATMENT PLANT
 11791 SW 49TH STREET
 COOPER CITY, FL 33330

PROPERTY INFORMATION:
 FOLIO: 504025100010
 ZONING: U-1

PROPERTY OWNER INFORMATION:
 OWNER: CITY OF COOPER CITY
 CONTACT: GEORGE GARBA
 PHONE: (954) 434-5510

PROPERTY LOCATION:
 COUNTY: BROWARD
 TOWNSHIP: 50 SOUTH
 RANGE: 40 EAST
 SECTION: 25
 LATITUDE: 26° 3' 32" N
 LONGITUDE: 80° 18' 16" W



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CHECKED	JNM		
PROJ. ENGR.	JMW		
NO.	DATE	ISSUED FOR	BY
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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	GAB		
DRAWN	TB		
CHECKED	JNM		
PROJ. ENGR.	JMW		
NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

Hazen
 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

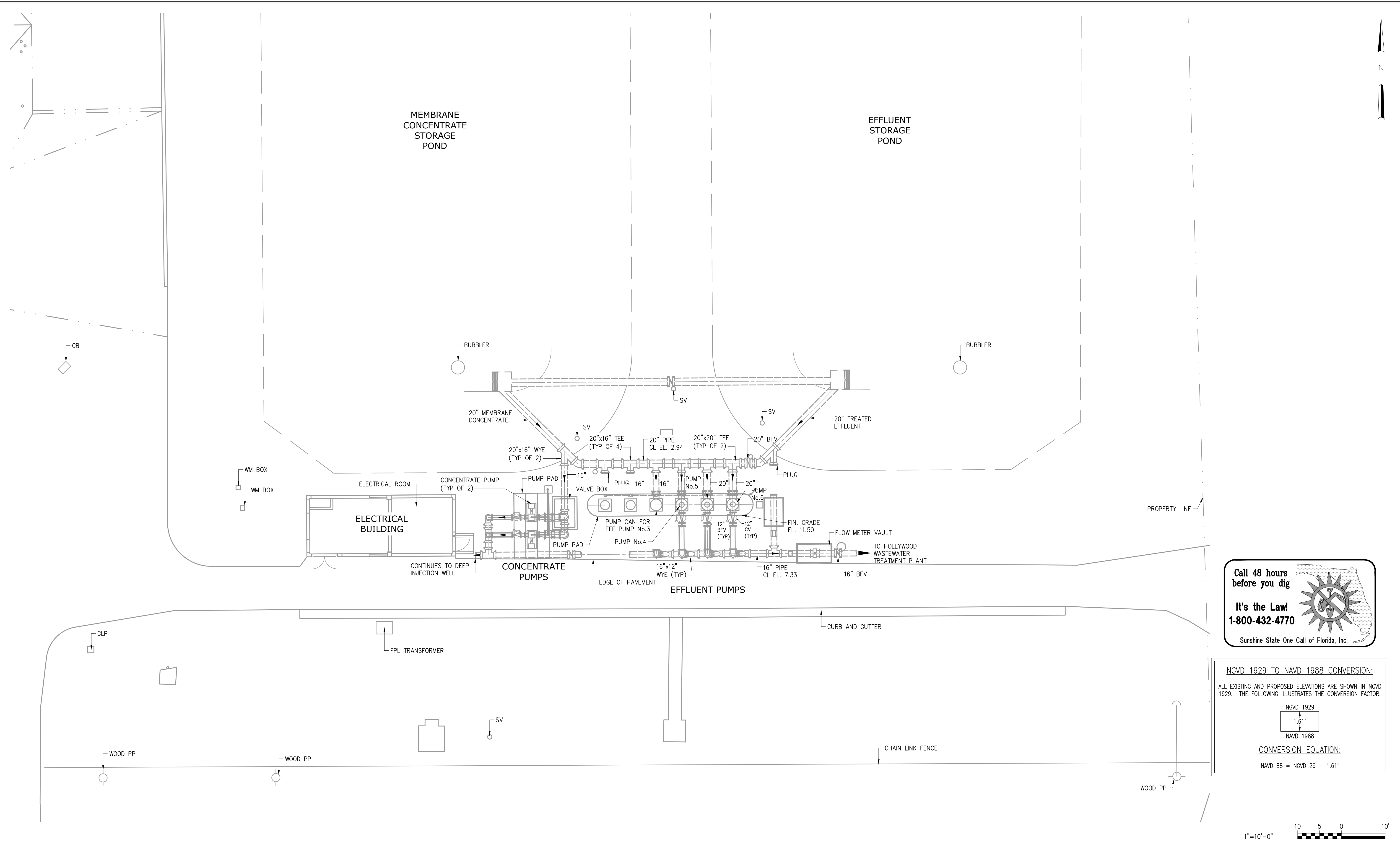
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CLIENTS PROJECT:	-
ENGINEERS PROJECT:	4679-004
CAD REFERENCE:	4679-004-G04.dwg


COOPER CITY
 CITY OF Cooper City
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COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
STAGING PLAN

DATE:	MAY 2023
SHEET:	4 OF 22
DRAWING:	G-04

BID SET



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NGVD 1929 TO NAVD 1988 CONVERSION:
 ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

CONVERSION EQUATION:
 NAVD 88 = NGVD 29 - 1.61'



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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED: GAB
 DRAWN: TB
 CHECKED: JNM
 PROJ. ENGR.: JMW

GEORGE A. BROWN P.E.
 No. 56076

Hazen
 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE
 1"=10'

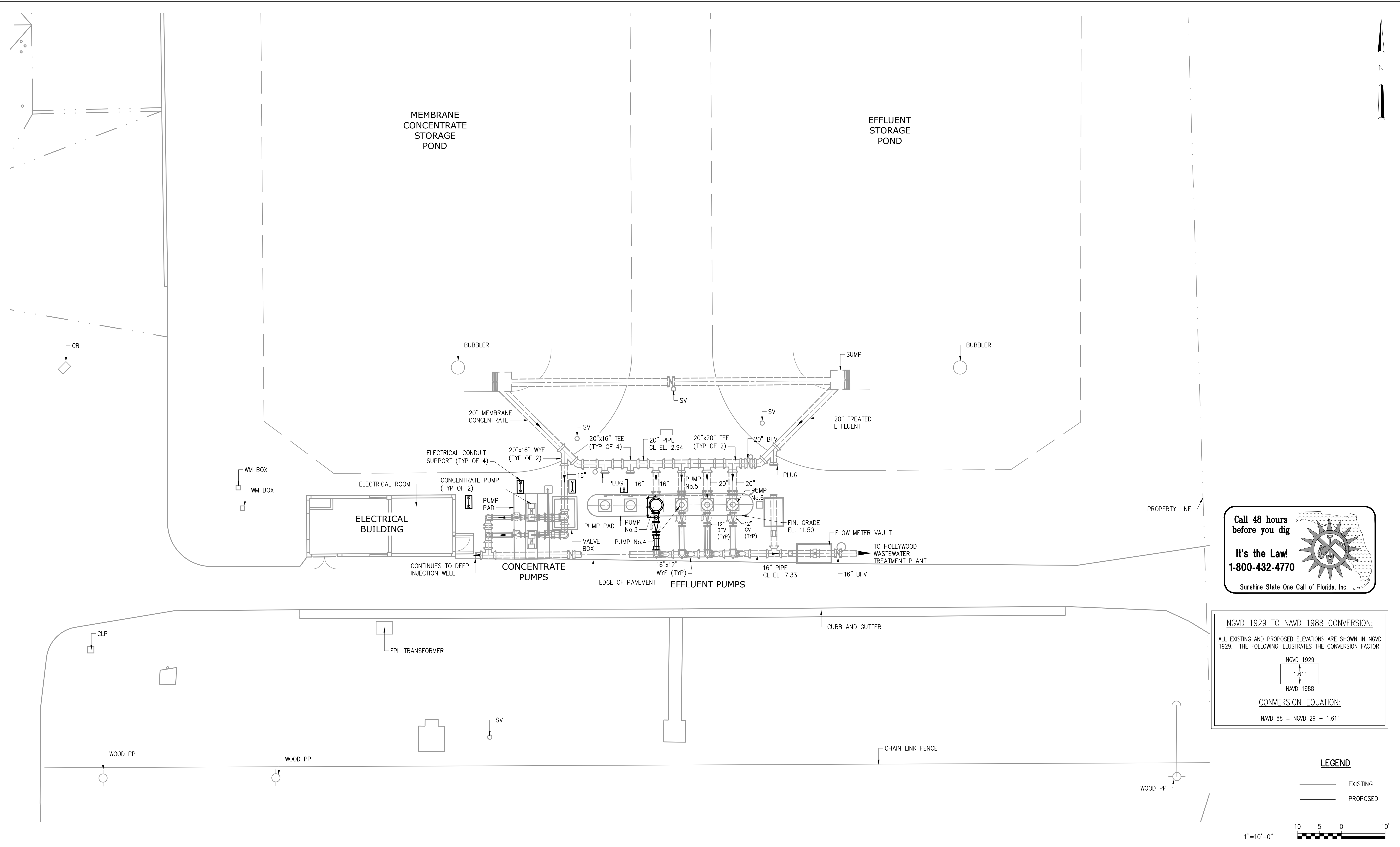
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 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-C01.dwg

COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
EXISTING SITE PLAN

DATE: MAY 2023
 SHEET: 5 OF 22
 DRAWING: C-01

BID SET



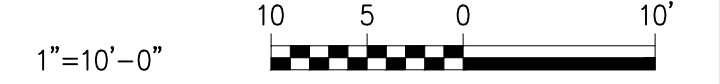
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 Sunshine State One Call of Florida, Inc.

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CONVERSION EQUATION:
 NAVD 88 = NGVD 29 - 1.61'

LEGEND

— EXISTING
 — PROPOSED



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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW

GEORGE A. BROWN P.E.
 No. 56076

HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE
 1"=10'

CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-C02.dwg

COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
PROPOSED SITE PLAN

DATE: MAY 2023
 SHEET: 6 OF 22
 DRAWING: C-02

BID SET

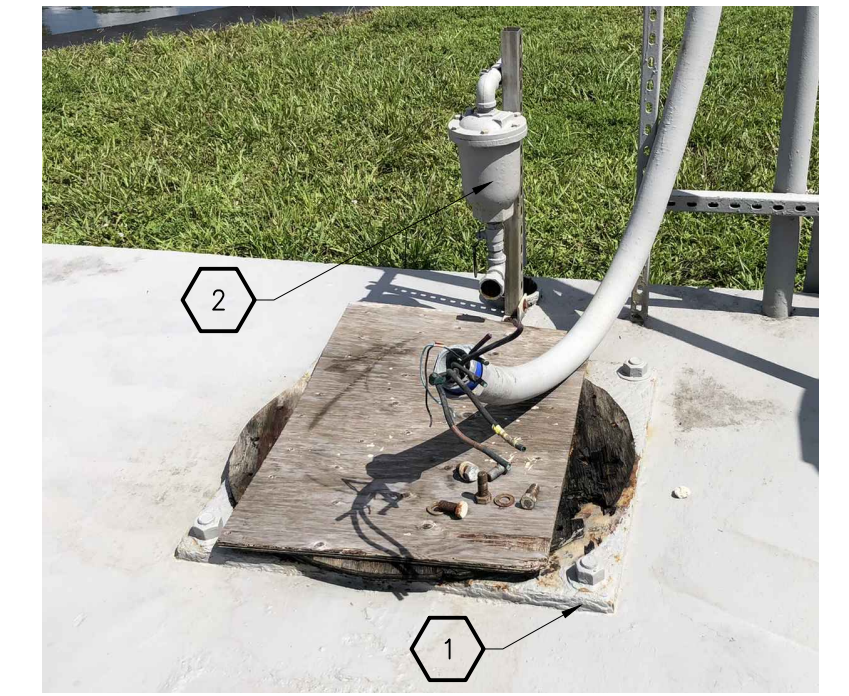
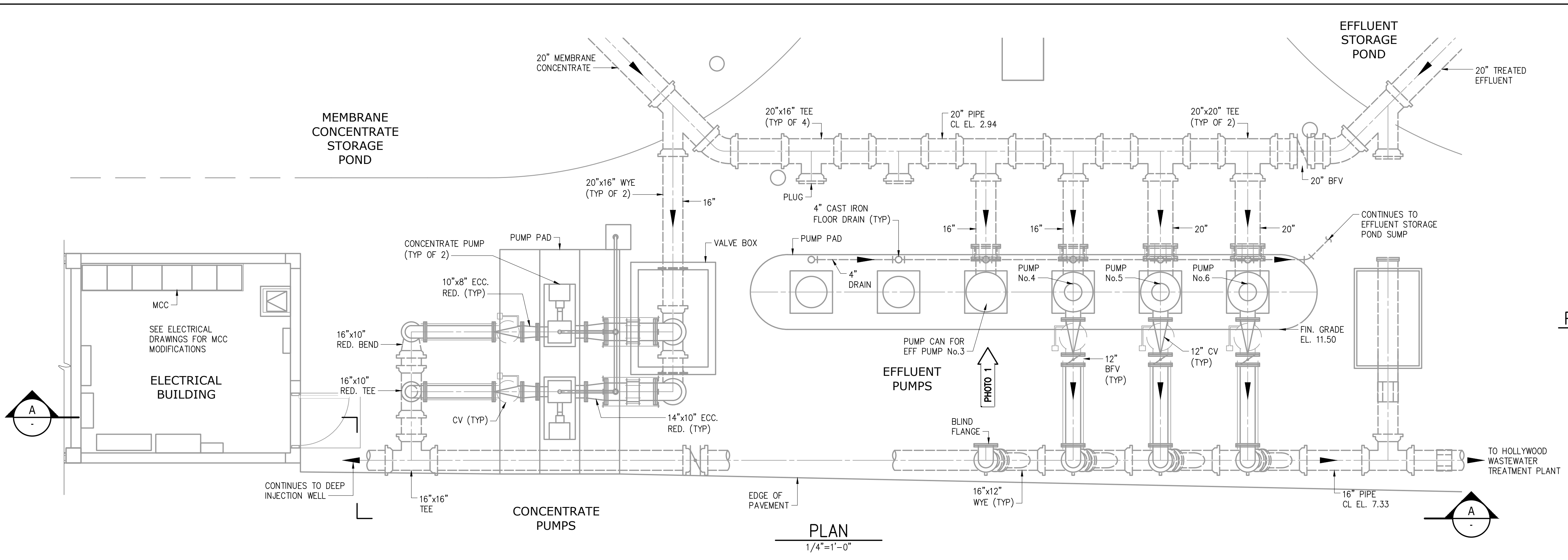
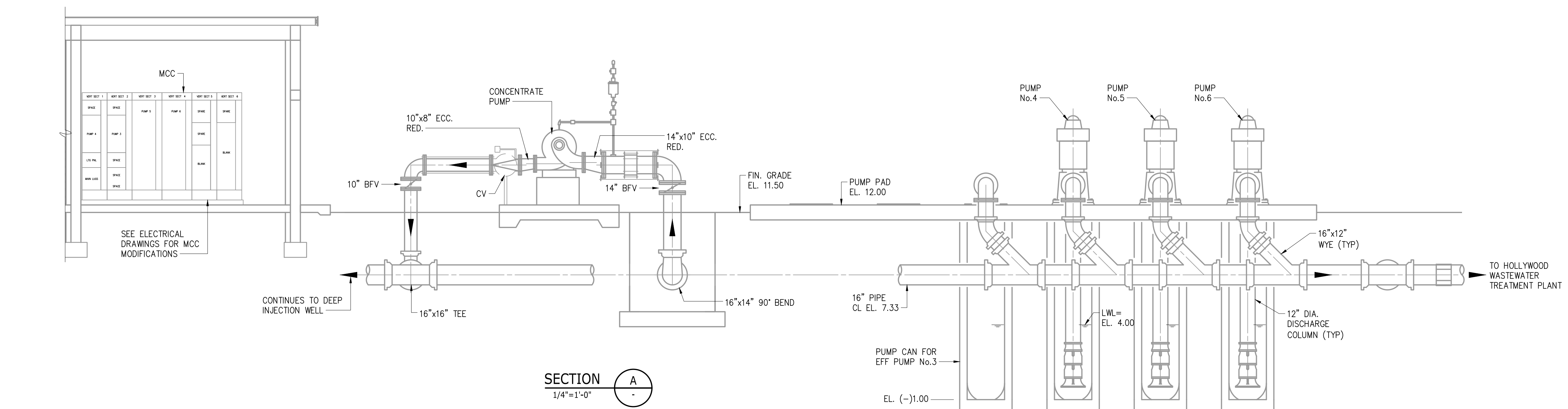


PHOTO 1 - EXISTING SOLE PLATE
NTS



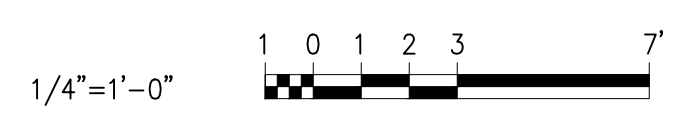
- KEYED NOTES:**
- 1 EXISTING SOLE PLATE TO BE REMOVED.
 - 2 EXISTING AIR RELEASE VALVE TO BE REMOVED.

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NGVD 1929 TO NAVD 1988 CONVERSION:
ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

NGVD 1929	1.61'	NAVD 1988
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CONVERSION EQUATION:
NAVD 88 = NGVD 29 - 1.61'



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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW

GEORGE A. BROWN P.E.
No. 56076

Hazen
HAZEN AND SAWYER
4000 HOLLYWOOD BOULEVARD, SUITE 750N
HOLLYWOOD, FLORIDA 33021

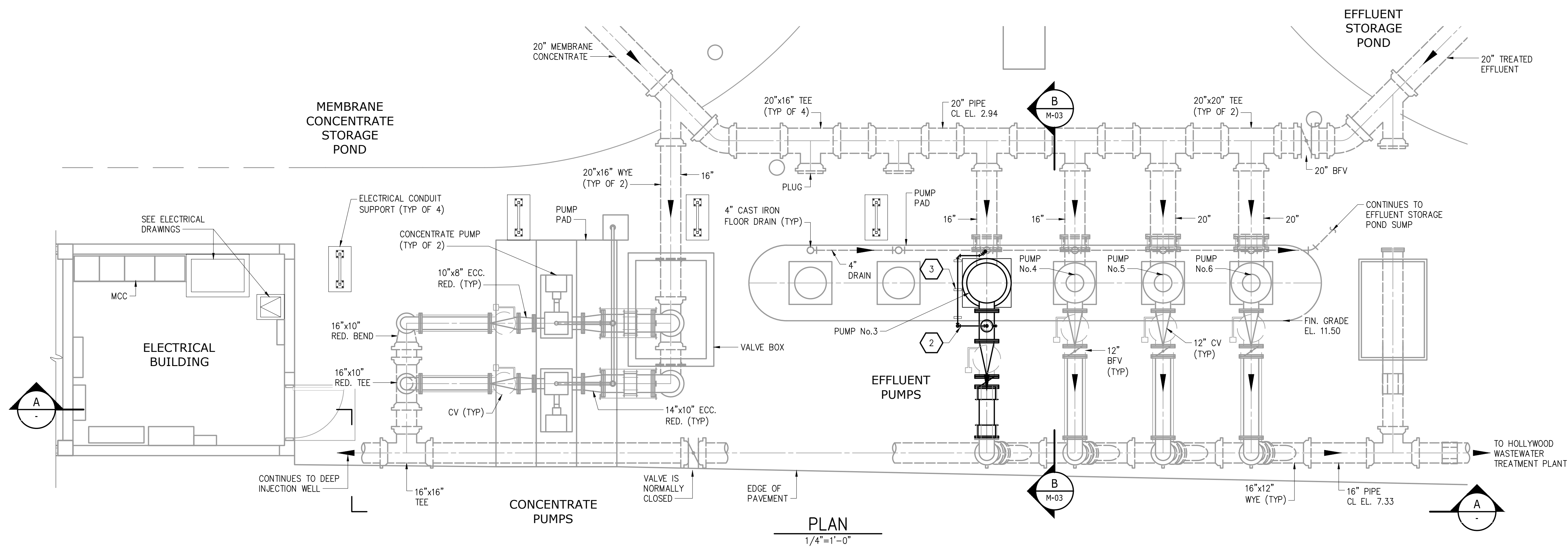
SCALE: AS NOTED
CLIENTS PROJECT: -
ENGINEERS PROJECT: 4679-004
CAD REFERENCE: 4679-004-M01.dwg

COOPER CITY
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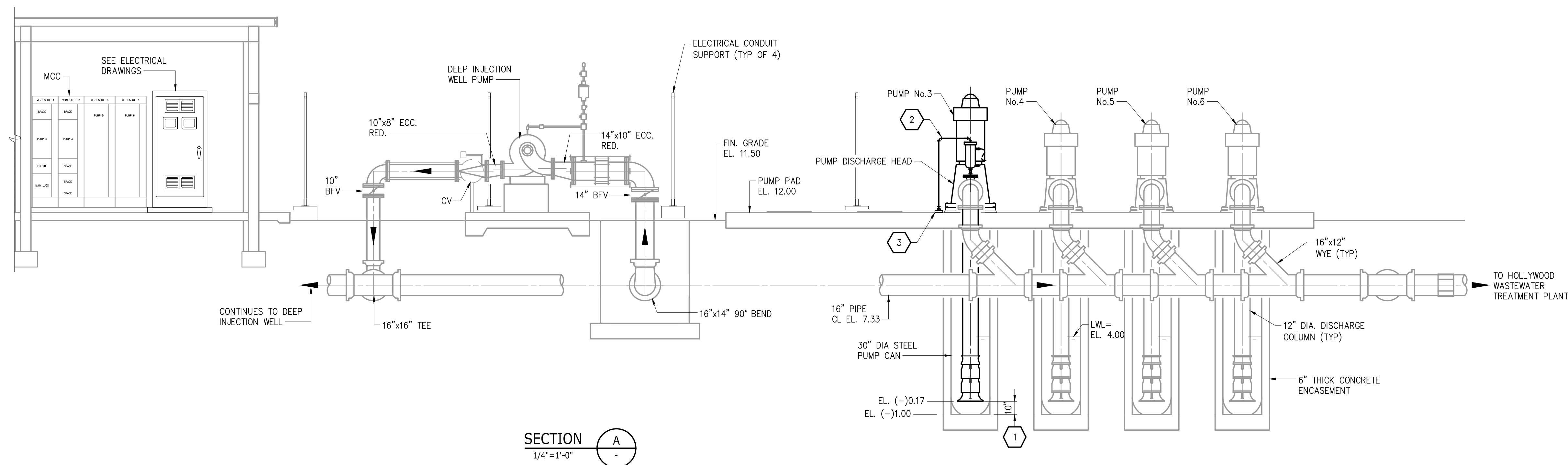
COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
EXISTING PLAN AND SECTION

DATE: MAY 2023
SHEET: 7 OF 22
DRAWING: M-01

BID SET



- KEYED NOTES:**
- 1 THE CONTRACTOR SHALL CONFIRM THIS DISTANCE WITH THE PUMP MANUFACTURER.
 - 2 2-INCH GALVANIZED STEEL SCHEDULE 80 PIPE. ROUTE TO NEAREST FLOOR DRAIN. PROVIDE SUPPORTS AS REQUIRED. PROVIDE 4-INCH AIR GAP BETWEEN DRAIN PIPE AND FLOOR DRAIN.
 - 3 STAINLESS STEEL UNISTRUT PIPE SUPPORT MOUNTED TO PUMP PAD.

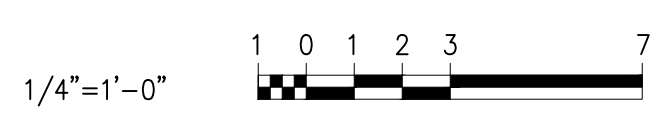


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NGVD 1929 TO NAVD 1988 CONVERSION:
 ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

CONVERSION EQUATION:
 NAVD 88 = NGVD 29 - 1.61'

- LEGEND**
- EXISTING
 - PROPOSED



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NO.	DATE	ISSUED FOR	BY
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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW

GEORGE A. BROWN P.E.
 No. 56076

Hazen
 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

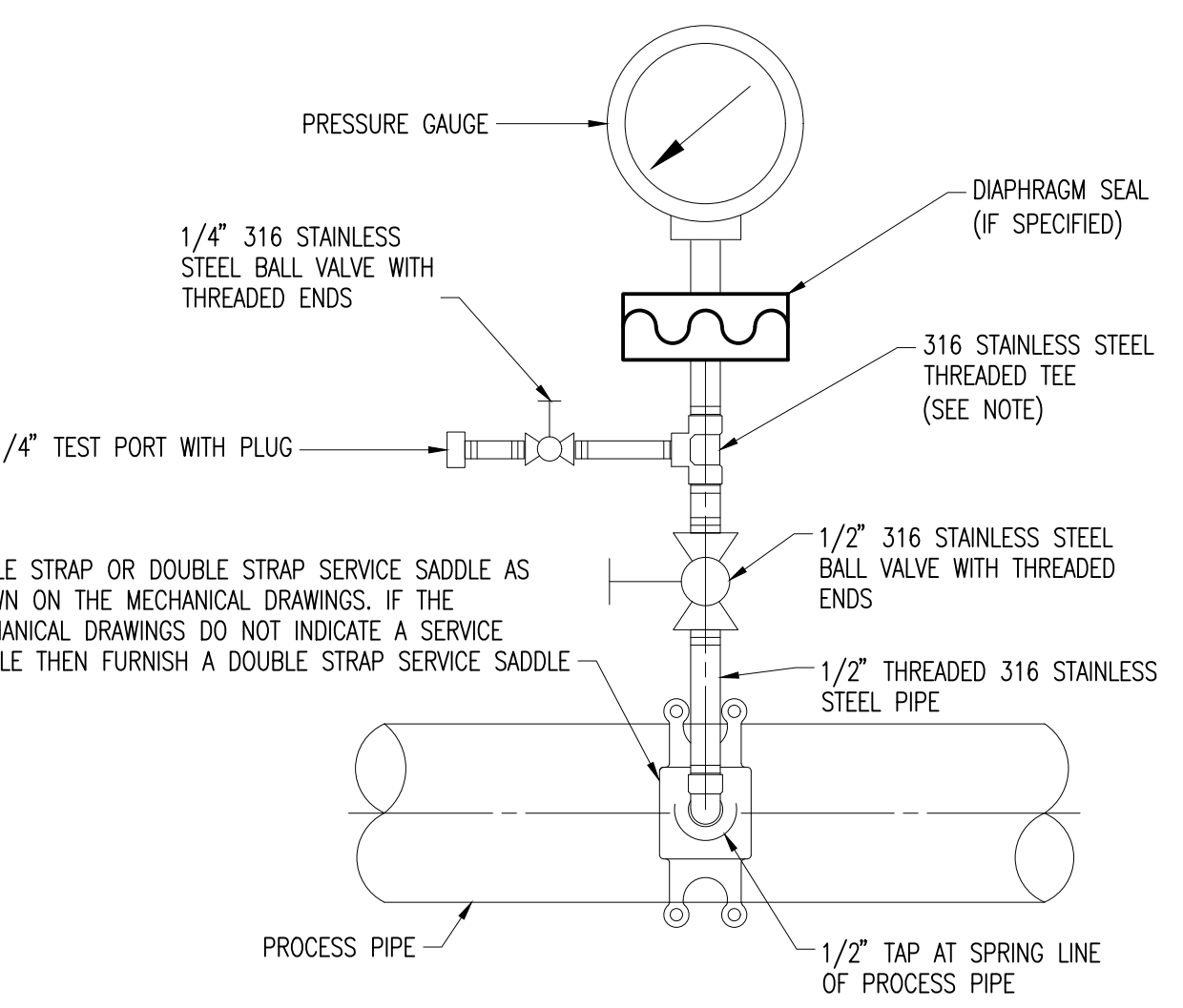
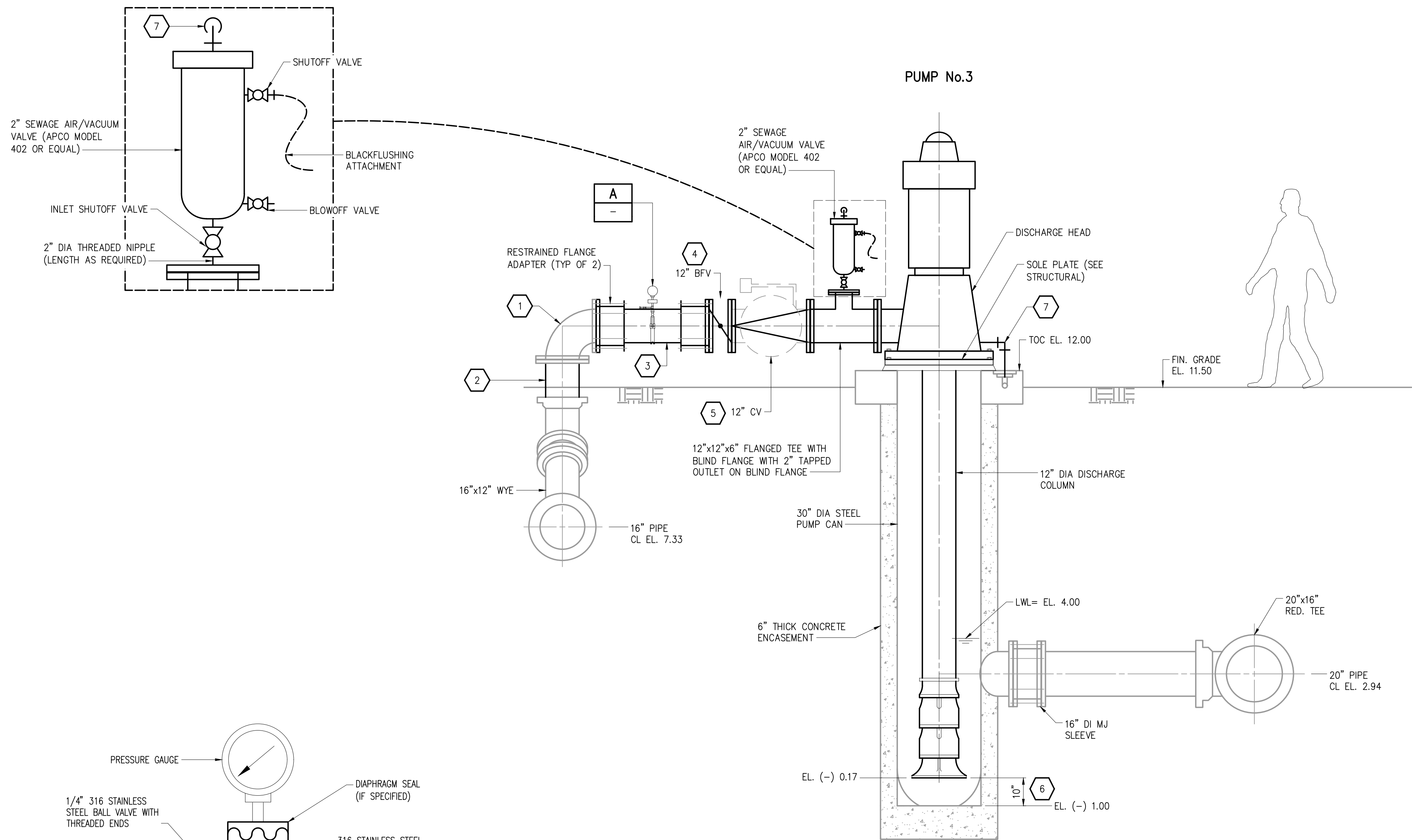
SCALE: AS NOTED
 CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-M02.dwg

COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
PROPOSED PLAN AND SECTION

DATE: MAY 2023
 SHEET: 8 OF 22
 DRAWING: M-02

BID SET



- NOTES:**
- IF A DIAPHRAGM SEAL IS REQUIRED, INSTALL THE TEST PORT AND VALVE ON THE SEAL'S FLUSHING CONNECTION INSTEAD OF TEE.

PRESURE GAUGE INSTRUMENT OR SWITCH

DETAIL	A
NTS	-

SECTION B
1/2"=1'-0" M-02

KEYED NOTES:

- EXISTING 12" DUCTILE IRON FLG X FLG 90 DEGREE BEND.
- REMOVE EXISTING 12" DUCTILE IRON RISER AND REPLACE WITH NEW DUCTILE IRON RISER WITH LENGTH TO SUIT THE HEIGHT OF THE PROPOSED PUMP DISCHARGE OUTLET.
- THE CITY HAS AN EXISTING UNINSTALLED 12" DUCTILE IRON PE X PE SPOOL PIECE WITH FLANGE ADAPTERS. THE CONTRACTOR SHALL REMOVE THE FLANGE ADAPTERS AND PREPARE AND PAINT THE SPOOL PIECE. INSTALL SPOOL PIECE AT THIS LOCATION USING EBAA IRON SERIES 2100 RESTRAINED FLANGE ADAPTERS. CUT SPOOL PIECE TO LENGTH AS NEEDED.
- THE CITY HAS AN EXISTING UNINSTALLED 12" FLG X FLG BUTTERFLY VALVE. THE CONTRACTOR SHALL PREPARE AND PAINT THE BUTTERFLY VALVE. INSTALL THE BUTTERFLY VALVE AT THIS LOCATION.
- THE CITY HAS AN EXISTING UNINSTALLED 12" FLG X FLG CHECK VALVE. THE CONTRACTOR SHALL PREPARE AND PAINT THE CHECK VALVE. INSTALL THE CHECK VALVE AT THIS LOCATION.
- THE CONTRACTOR SHALL CONFIRM THIS DISTANCE WITH THE PUMP MANUFACTURER.
- 2-INCH GALVANIZED STEEL SCHEDULE 80 PIPE. ROUTE TO NEAREST FLOOR DRAIN. PROVIDE SUPPORTS AS REQUIRED. PROVIDE 4-INCH AIR GAP BETWEEN DRAIN PIPE AND FLOOR DRAIN.

GENERAL NOTES:

- CLEAN AND PAINT ALL PROPOSED METAL SURFACE. SEE SPECIFICATION TITLED "PAINTING".
- CLEAN AND PAINT ALL EXISTING METAL SURFACES INCLUDING THE DUCTILE IRON ELBOW, SPOOL PIECE, BUTTERFLY VALVE, AND CHECK VALVE. SEE SPECIFICATION TITLED "PAINTING".

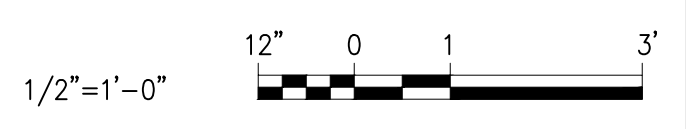
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NGVD 1929 TO NAVD 1988 CONVERSION:
ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

CONVERSION EQUATION:
NAVD 88 = NGVD 29 - 1.61'

LEGEND

- EXISTING
- PROPOSED



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 PLOT DATE: 2023/05/05 11:43:28 AM
 BY: EES020

DESIGNED	GAB
DRAWN	TB
CHECKED	JNM
PROJ. ENGR.	JMW
DATE	ISSUED FOR
3	05/23
2	08/22
1	07/22
NO.	DATE

GEORGE A. BROWN P.E.
 No. 56076

Hazen
HAZEN AND SAWYER
4000 HOLLYWOOD BOULEVARD, SUITE 750N
HOLLYWOOD, FLORIDA 33021

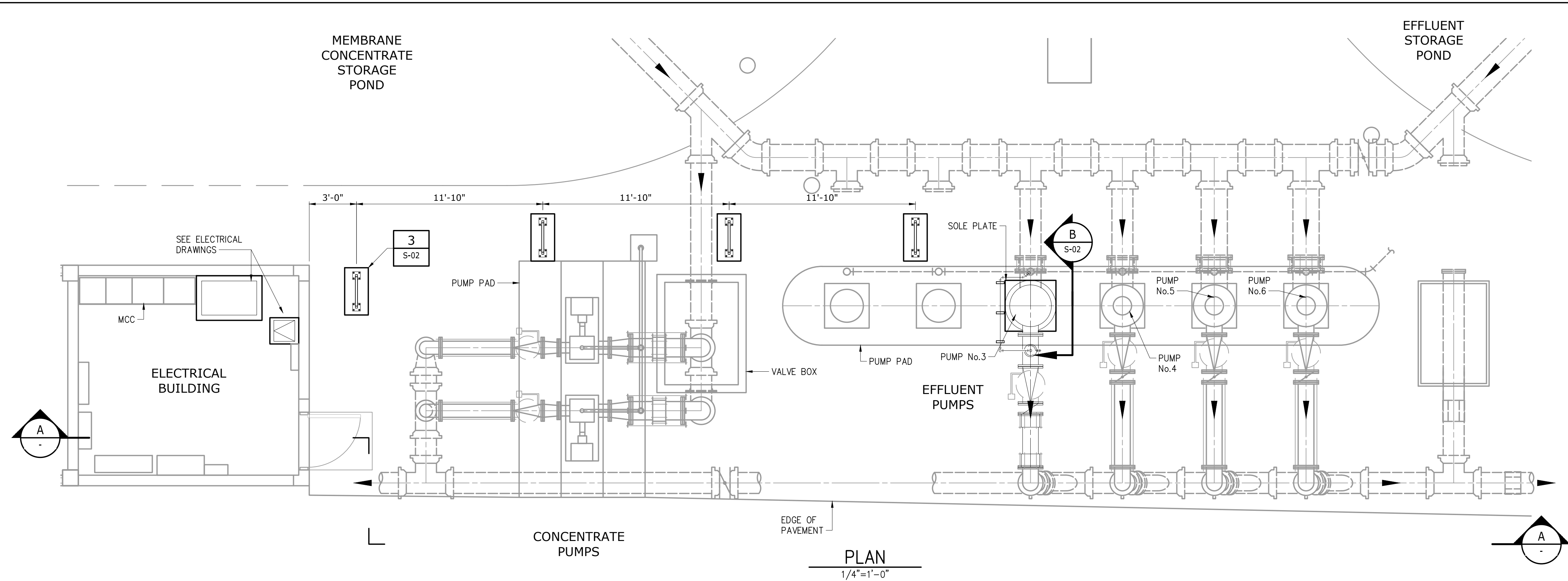
SCALE
 1/2"=1'-0"
 CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-M03.dwg

COOPER CITY

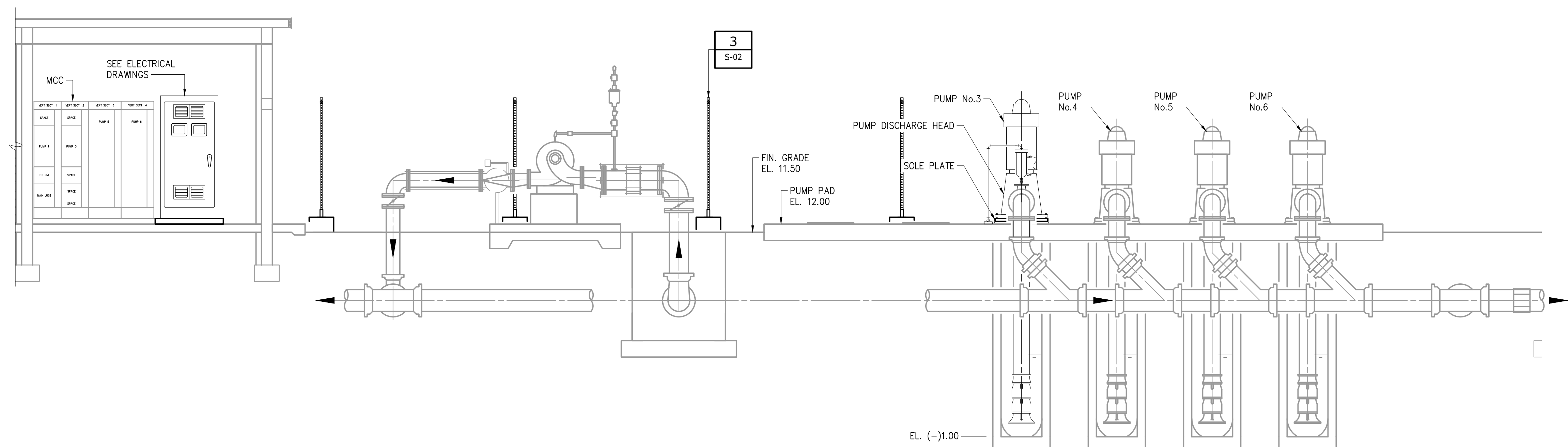
COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
MECHANICAL SECTIONS AND DETAILS

DATE: MAY 2023
 SHEET: 9 OF 22
 DRAWING: M-03

BID SET



PLAN
1/4"=1'-0"



SECTION A
1/4"=1'-0"

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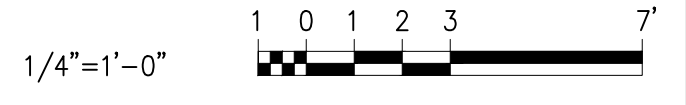
NGVD 1929 TO NAVD 1988 CONVERSION:
ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

NGVD 1929	1.61'
NAVD 1988	1

CONVERSION EQUATION:
NAVD 88 = NGVD 29 - 1.61'

LEGEND

- EXISTING
- PROPOSED



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DESIGNED	GAB
DRAWN	TB
CHECKED	SJ
PROJ. ENGR.	JMW

NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

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HOLLYWOOD, FLORIDA 33021

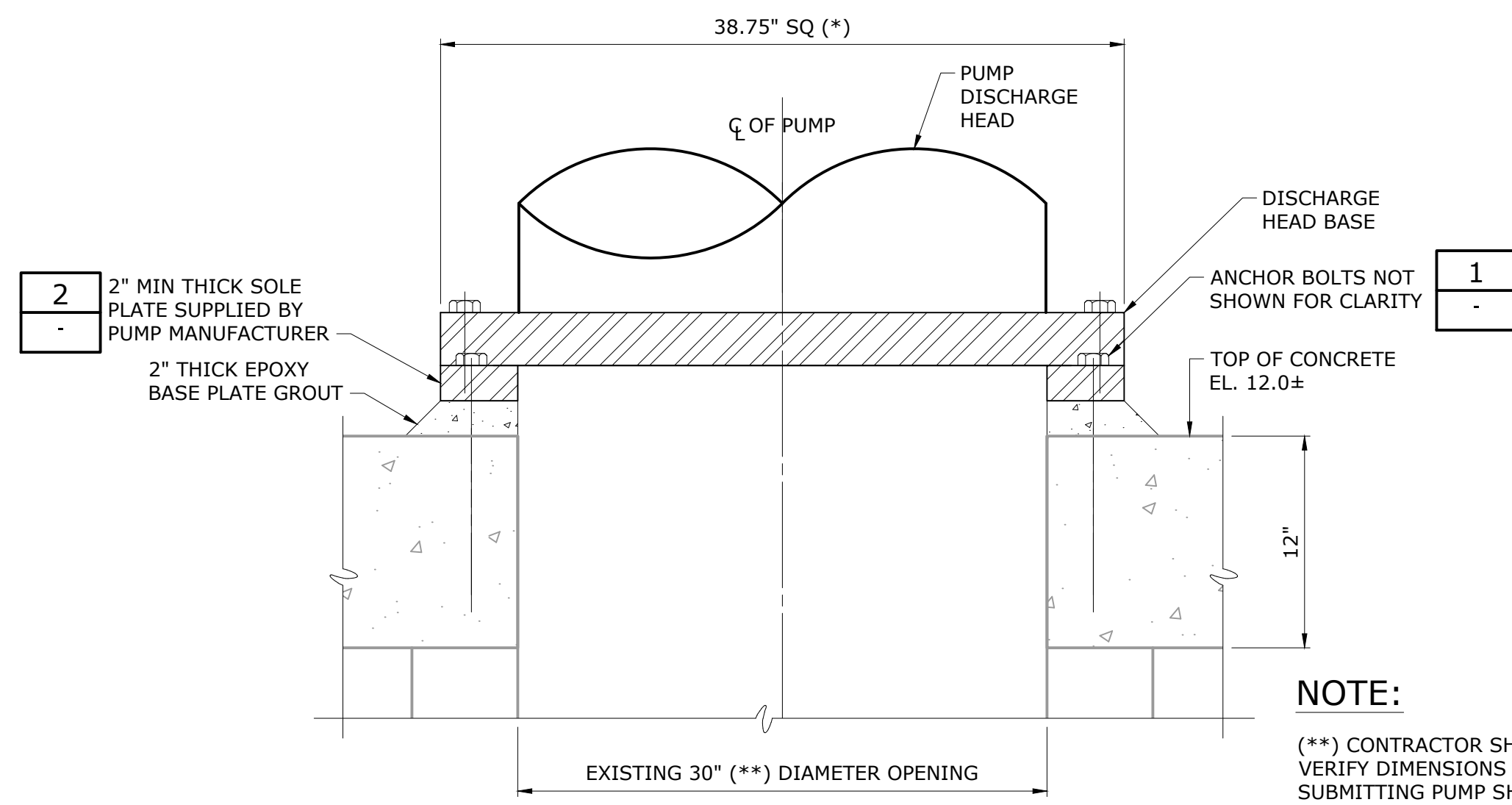
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CAD REFERENCE:	4679-004-S01.dwg

COOPER CITY
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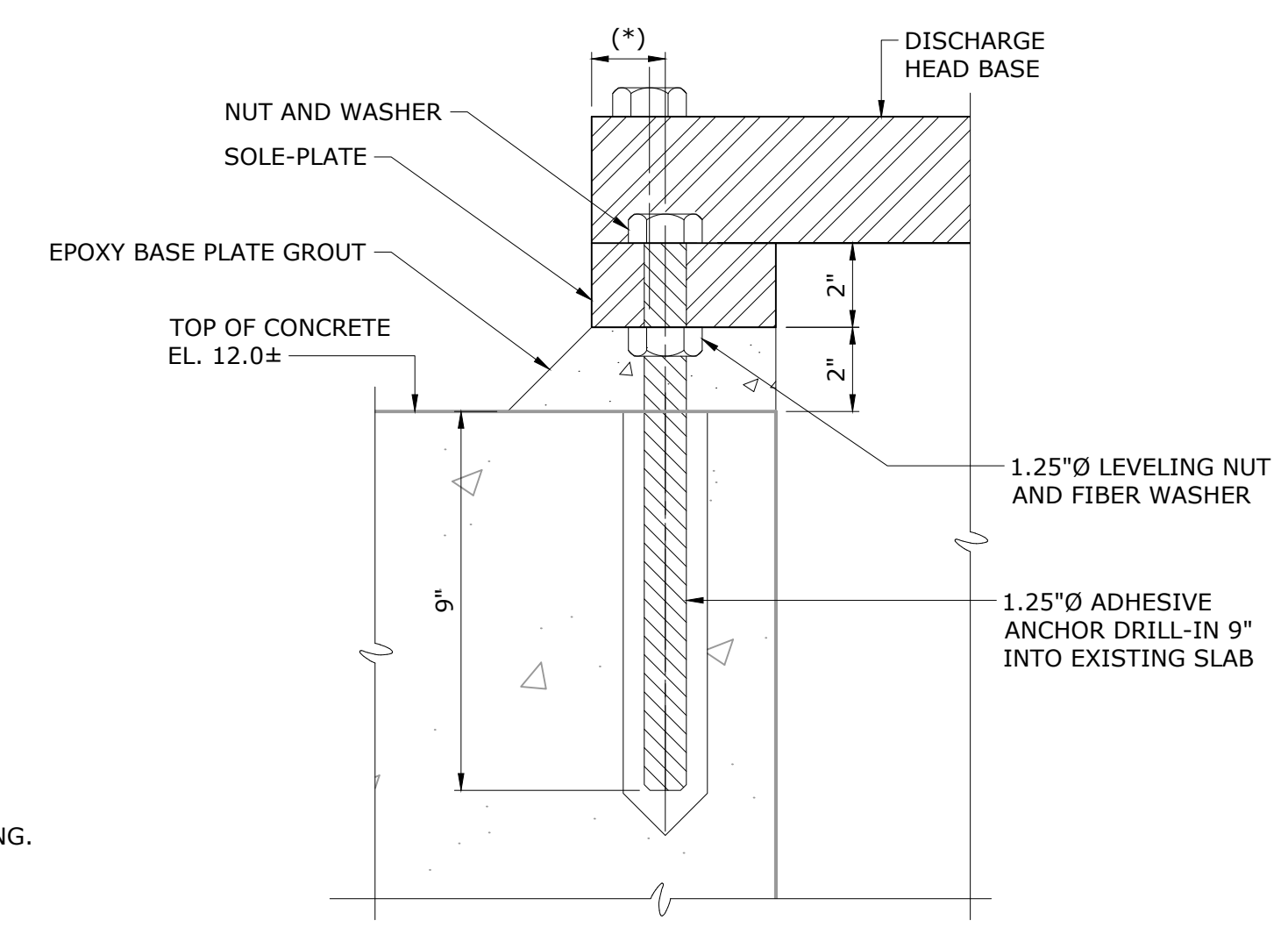
COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
ELECTRICAL CONDUIT SUPPORT
PLAN AND SECTIONS

DATE:	MAY 2023
SHEET:	10 OF 22
DRAWING:	S-01

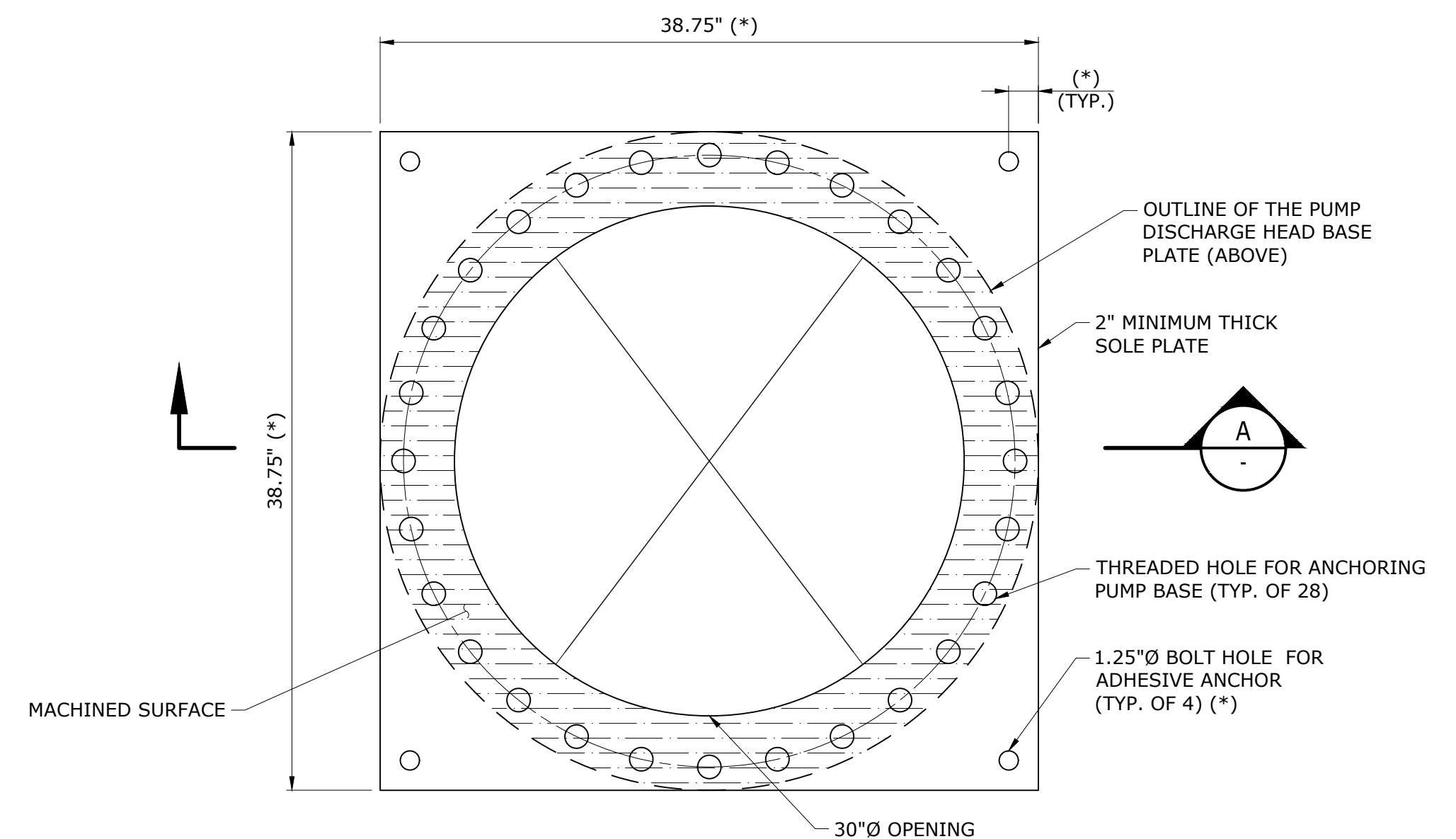
BID SET



SECTION B
1 1/2" = 1'-0"
S-01



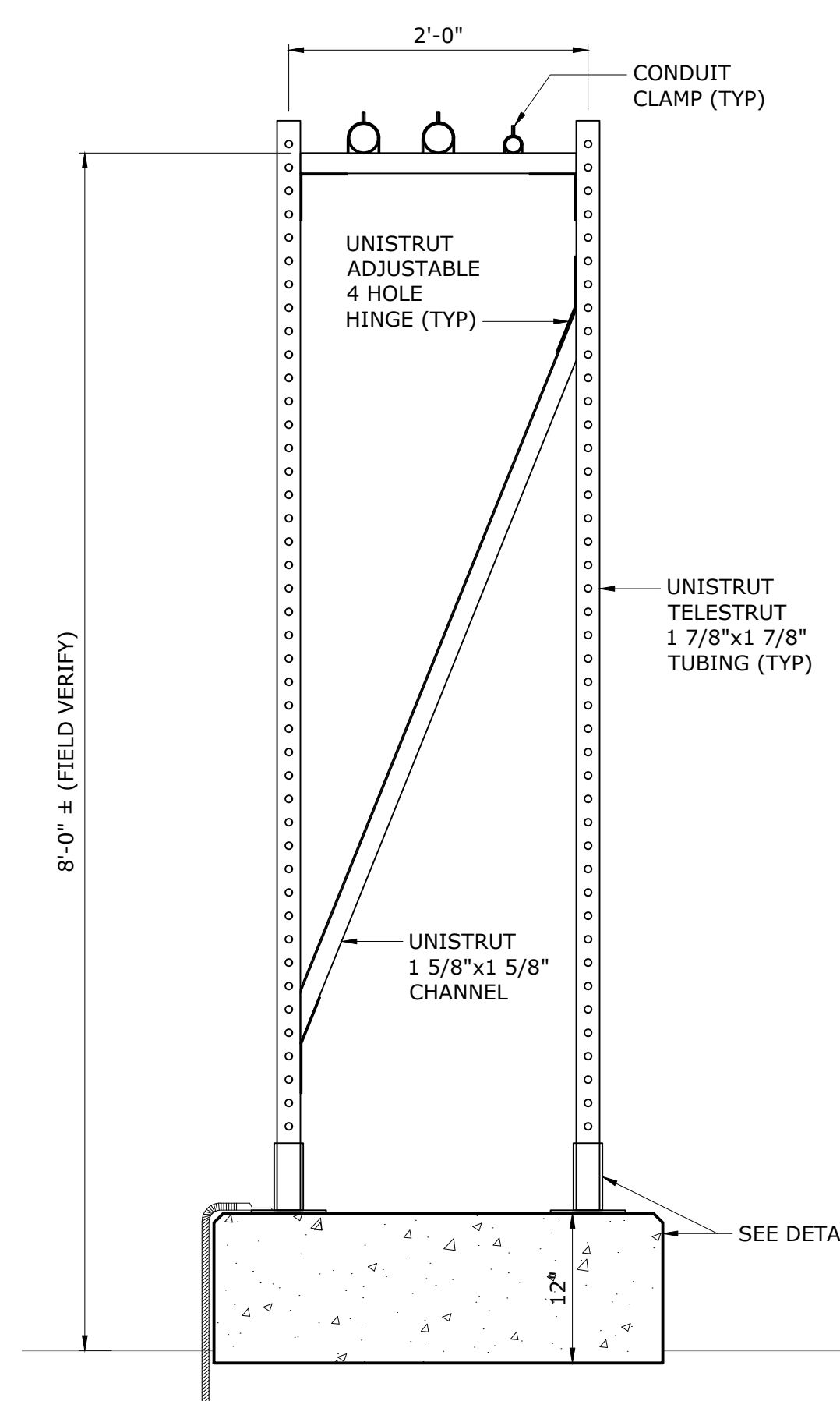
DETAIL 1
3" = 1'-0"
-



DETAIL 2
1 1/2" = 1'-0"
S-02

SOLE PLATE NOTES:

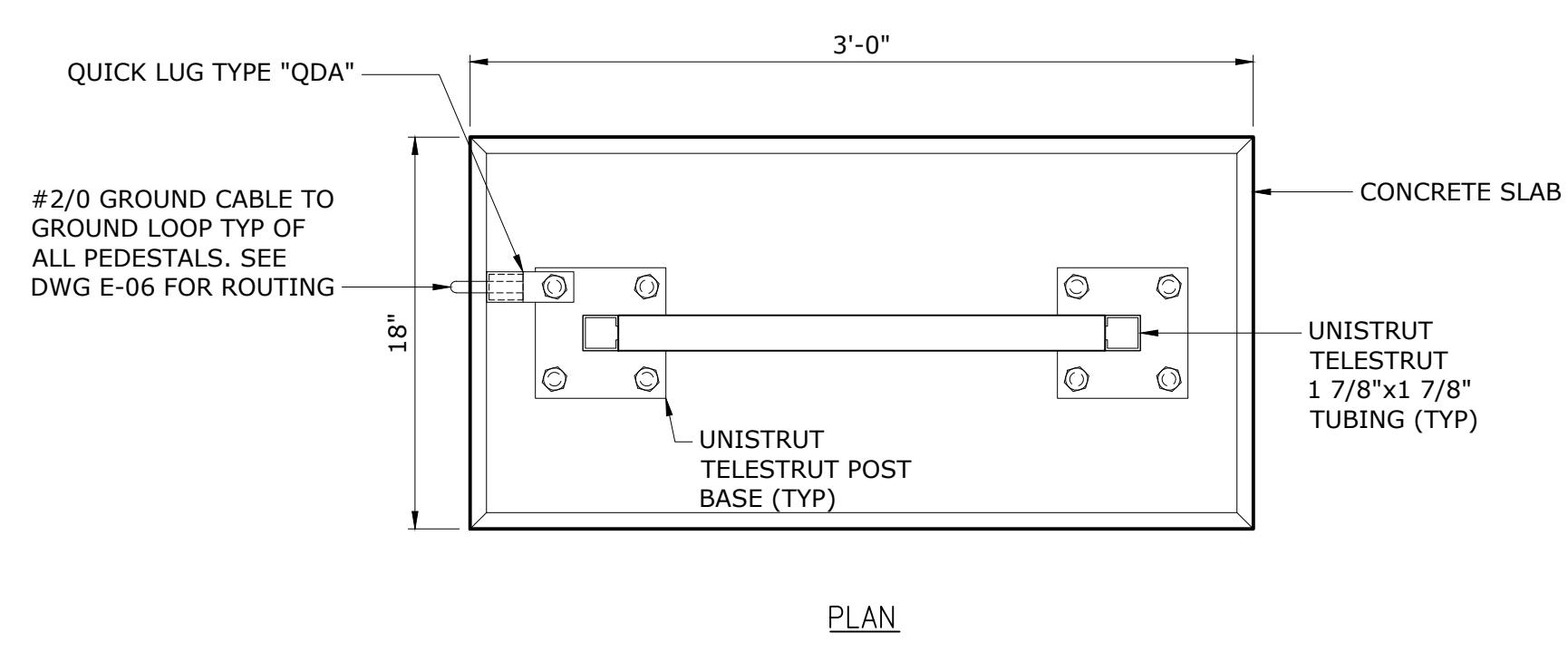
- SOLE PLATE SHALL BE DESIGNED AND SUPPLIED BY THE PUMP MANUFACTURER.
- THE CONTRACTOR IS RESPONSIBLE FOR THE ANCHOR DESIGN. SUBMIT SHOP DRAWING OF ANCHOR DESIGN WITH SIGNED AND SEALED CALCULATIONS AND DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA. THE CONTRACTOR SHALL COORDINATE THE ANCHOR DESIGN AND THE SOLE PLATE DESIGN.
- THE CONTACT AREA OF THE TOP OF THE SOLE PLATE SHALL BE MACHINED SMOOTH PER THE REQUIREMENTS OF THE PUMP MANUFACTURER.
- SOLE PLATE SHALL BE LEVELED TO THE TOLERANCE SPECIFIED IN THE MANUFACTURER'S SHOP DRAWING (OR INSTALLATION INSTRUCTIONS) IN THE PRESENCE OF THE PUMP MANUFACTURER'S TECHNICAL REPRESENTATIVE.
- DIMENSION MARKED WITH AN ASTERISK (*) MAY VARY BASED ON PUMP SUPPLIED. THE MAXIMUM DIMENSION SHALL BE COORDINATED BY THE CONTRACTOR TO ENSURE NO CONFLICT WITH THE EXISTING STRUCTURE.
- EPOXY BASE PLATE GROUT SHALL BE "SIKADUR 42, GROUT-PAK" BY SIKA CORPORATION.



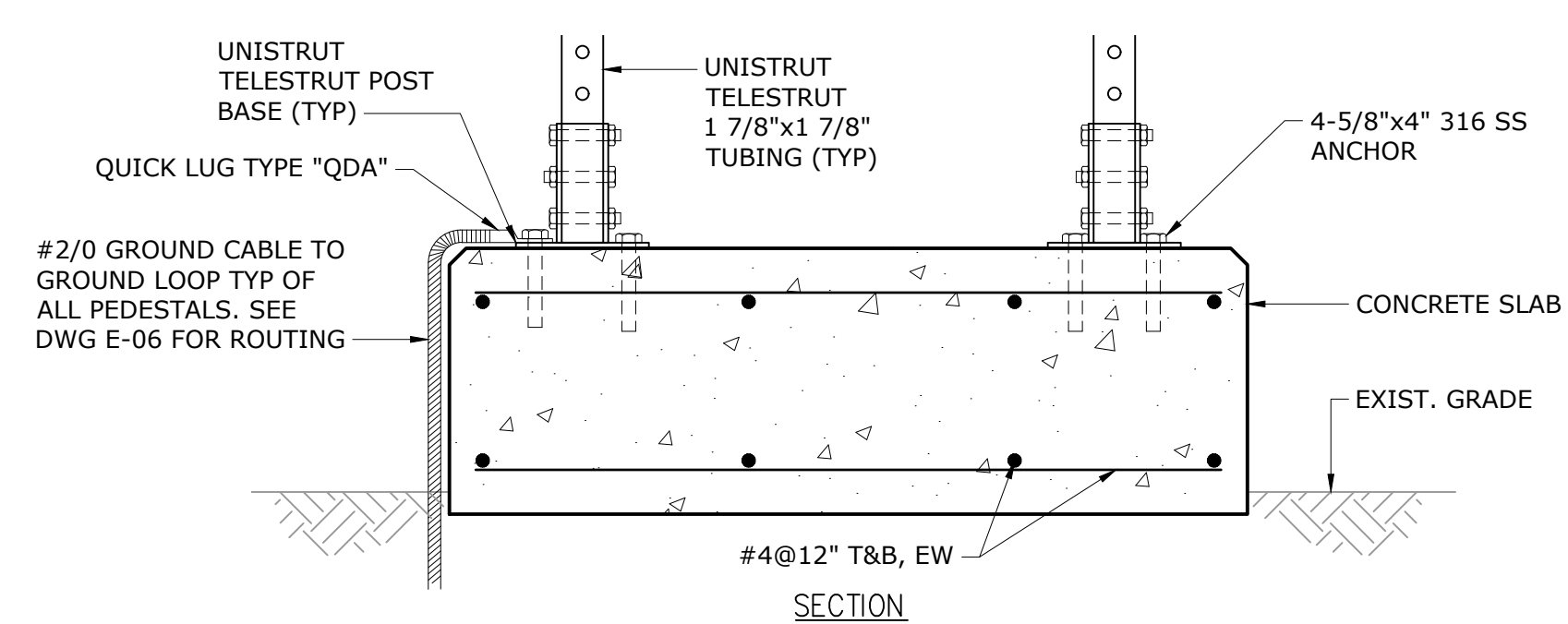
ELECTRICAL CONDUIT SUPPORT

DETAIL 3
1" = 1'-0"
S-01

- NOTES:**
- ALL MATERIALS SHOWN ARE ATKORE UNISTRUT PRODUCTS. ALTERNATE PRODUCTS MAY BE SUBMITTED FOR REVIEW.
 - ALL FRAMING MATERIALS SHALL BE GALVANIZED (C-90).
 - FASTENERS SHALL BE TYPE 316 SS.
 - ISOLATE DISSIMILAR MATERIALS.



PLAN



SECTION

DETAIL A
1 1/2" = 1'-0"
S-02

NGVD 1929 TO NAVD 1988 CONVERSION:

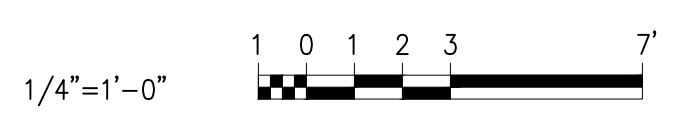
ALL EXISTING AND PROPOSED ELEVATIONS ARE SHOWN IN NGVD 1929. THE FOLLOWING ILLUSTRATES THE CONVERSION FACTOR:

CONVERSION EQUATION:

NAVD 88 = NGVD 29 - 1.61'

LEGEND

- EXISTING
- PROPOSED



File: C:\Users\j001\OneDrive\Documents\4679-004\4679-004-S02.dwg
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NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	GAB
DRAWN	TB
CHECKED	SJ
PROJ. ENGR.	JMW

SHAJAN JOYKUTTY P.E.
 No. 43323

Hazen

HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE: AS NOTED

CLIENTS PROJECT: -

ENGINEERS PROJECT: 4679-004

CAD REFERENCE: 4679-004-S02.dwg

COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT

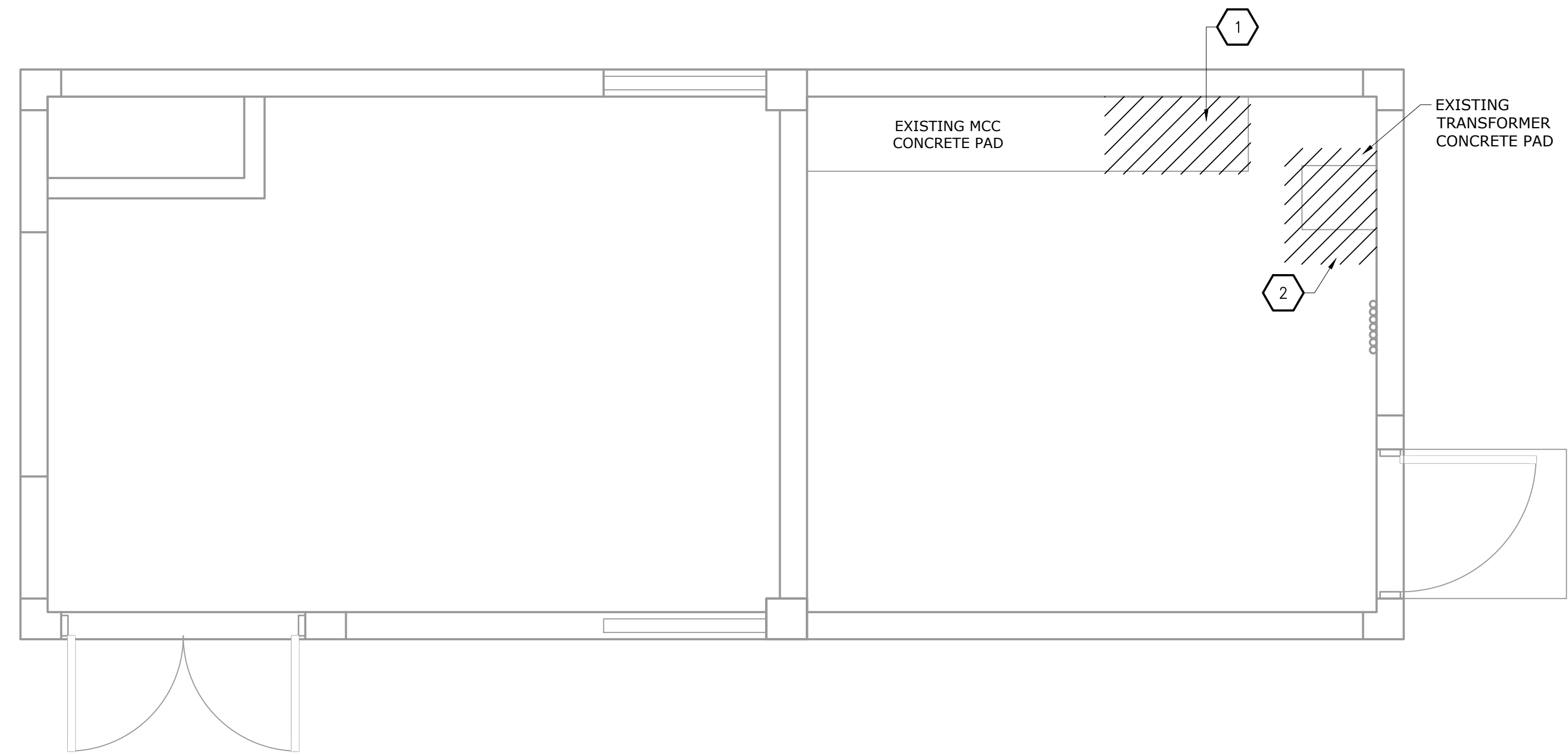
SECTION AND DETAILS

DATE: MAY 2023

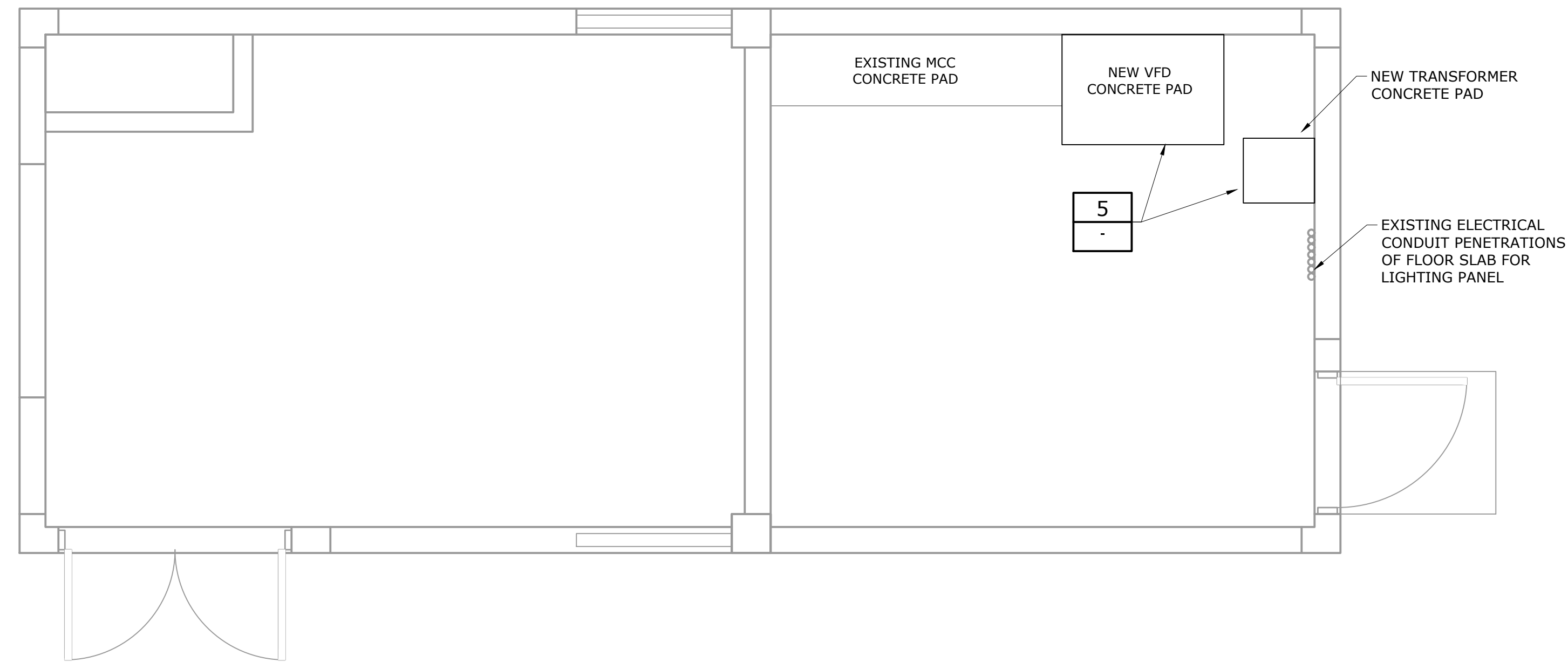
SHEET: 11 OF 22

DRAWING: S-02

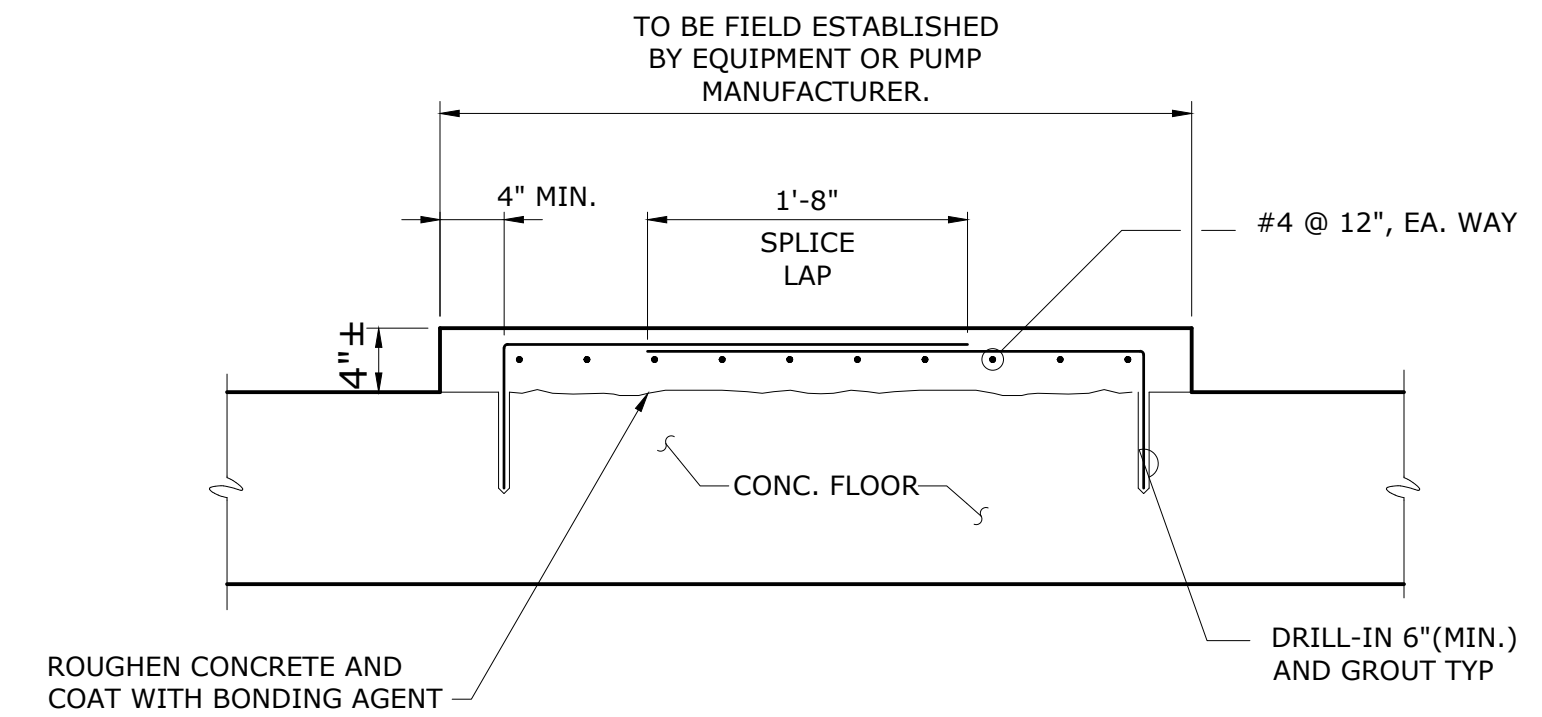
BID SET



EXISTING PLAN
3/8"=1'-0"



PROPOSED PLAN
3/8"=1'-0"



SECTION
HOUSE KEEPING PAD
DETAIL 5
NTS

NOTES:

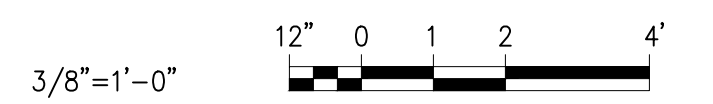
1. WHERE DRAWINGS INDICATE A CONCRETE EQUIPMENT PAD TO BE DEMOLISHED, THE FLOOR SLAB SURFACE SHALL BE REPAIRED AS APPROVED BY ENGINEER. FOLLOWING SELECT DEMOLITION AND REMOVAL OF THE EQUIPMENT PAD REMOVAL THE REPAIR SHALL BE:
 - A. SAWCUT THE FLOOR AROUND THE EQUIPMENT PAD PERIMETER TO A DEPTH OF 1/4".
 - B. SCARIFY AND REMOVE SLAB CONCRETE WITHIN THE PERIMETER TO A NOMINAL 1/4" DEPTH CLEAN AND REMOVE ALL CONCRETE LAITANCE.
 - C. RESURFACE THE AREA BY APPLYING A POLYMER MODIFIED OR SILICA FUME ENHANCED CEMENTITIOUS REPAIR MORTAR, APPROVED BY THE ENGINEER, FOLLOWING THE MANUFACTURER'S SURFACE PREPARATION AND APPLICATION RECOMMENDATIONS. LEVEL AND FINISH THE SURFACE TO MATCH THE FLOOR SLAB SURROUNDING AREA.
2. AFTER NEW VFD IS INSTALLED, CLEAN AND PREPARE ALL INTERIOR CONCRETE SURFACES, INCLUDING CEILING, FLOOR AND WALLS. COAT ALL INTERIOR CONCRETE SURFACES, INCLUDING CEILING, FLOOR AND WALLS WITH TWO COATS OF DURALKOTE 240, OR EQUAL.

KEYED NOTES:

- 1 SAW CUT AND REMOVE PORTION OF EXISTING CONCRETE PAD FOLLOWING REMOVAL OF MCC SECTIONS (COORDINATE WITH ELECTRICAL).
- 2 REMOVE EXISTING CONCRETE PAD AND REPLACE IT AT THE NEW LOCATION OF THE RELOCATED TRANSFORMER.

LEGEND

- EXISTING
- PROPOSED
- /// DEMOLISH



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DESIGNED	GAB
DRAWN	TB
CHECKED	SJ
PROJ. ENGR.	JMW

NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

SHAJAN JOYKUTTY P.E.
 No. 43323



HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

SCALE

3/8"=1'-0"

CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-S03.dwg



COOPER CITY

COOPER CITY UTILITIES DEPARTMENT

EFFLUENT PUMP REPLACEMENT

ELECTRICAL BUILDING

DATE: MAY 2023

SHEET: 12 OF 22

DRAWING: S-03

BID SET

BASIC ELECTRICAL REQUIREMENTS:			
1.0	Scope of Work		
1.1	THE SCOPE OF WORK SHALL BE AS DESCRIBED IN SPECIFICATION SECTION 16010.		
1.2	THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS AND TO INCLUDE ALL FEES AS PART OF HIS BID IF NOT OTHERWISE NOTED.		
1.3	THE CONTRACTOR SHALL, BEFORE SUBMITTING HIS BID, VISIT THE SITE OF THE PROJECT AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS. NO ALLOWANCE WILL BE MADE FOR EXISTING CONDITIONS OR FAILURE OF THE CONTRACTOR TO OBSERVE THEM.		
1.4	IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH ALL LOCAL UTILITIES, INCLUDING THE POWER AND TELEPHONE UTILITIES TO MEET ALL OF THEIR INSTALLATION REQUIREMENTS. ALL FEES, LABOR, EQUIPMENT OR MATERIALS NECESSARY TO MEET THESE REQUIREMENTS IS TO BE INCLUDED IN THE BID. THE CONTRACTOR SHALL OBTAIN, DELIVER AND INSTALL ALL CONDUITS, PULL-BOXES AND EQUIPMENT AS REQUIRED BY THE UTILITIES TO THEIR SPECIFICATIONS. THE TELEPHONE UTILITY REPRESENTATIVE IS THE CITY'S TELEPHONE CONTRACTOR.		
1.5	THE CONTRACTOR SHALL COORDINATE HIS WORK WITH THE ENGINEER AND OWNER.		
1.6	THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO INSTALL THE ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS. ITEMS NOT SHOWN BUT OBVIOUSLY NECESSARY FOR COMPLETION OF THE WORK SHALL BE INCLUDED.		
1.7	ALL EQUIPMENT AND MATERIAL SHALL BE NEW, UNUSED AND U.L. LISTED. ALL REFERENCES TO A PARTICULAR MANUFACTURER ARE GIVEN ON AN "APPROVED EQUAL" BASIS.		
1.8	THE CONTRACTOR IS RESPONSIBLE TO TEST ALL SYSTEMS INSTALLED OR MODIFIED UNDER THIS PROJECT AND REPAIR OR REPLACE ALL DEFECTIVE WORK TO THE SATISFACTION OF THE ENGINEER AND OWNER.		
1.9	ALL EQUIPMENT FURNISHED AND INSTALLED BY THE CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE UNLESS OTHERWISE INDICATED IN SPECIFICATIONS.		
1.10	SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL ELECTRICAL & CONTROL EQUIPMENT AND MATERIAL.		
2.0	Codes and Standards		
2.1	THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MINIMUM FOLLOWING STANDARDS AND CODES:		
2.2	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)		
2.3	NATIONAL ELECTRICAL CODE (NEC), (NFPA 70 2017 EDITION)		
2.4	NATIONAL ELECTRICAL SAFETY CODE, (NFPA 70E 2021 EDITION)		
2.5	STANDARD FOR FIRE PROTECTION IN WASTEWATER TREATMENT AND COLLECTION FACILITIES, (NFPA 820 2020 EDITION)		
2.6	OTHER NFPA CODES AS APPLICABLE		
2.7	FLORIDA BUILDING CODE (FBC 2020 EDITION)		
2.8	LOCAL CODES, CITY CODES REQUIRED BY THE AUTHORITY HAVING JURISDICTION.		
2.9	AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)		
2.10	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)		
2.11	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)		
2.12	INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)		
2.13	OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)		
2.14	AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)		
2.15	UNDERWRITERS LABORATORIES (UL) LISTING AND LABELING FOR ALL MATERIALS AND EQUIPMENT WHERE APPLICABLE STANDARDS EXIST		
3.0	General Items		
3.1	ALL CIRCUITS SHALL BE IDENTIFIED IN JUNCTION BOXES, PULL BOXES, CONTROL PANELS, PANELBOARDS, LIGHTING POLES, CONTROLLERS AND SERVICE POINTS. IDENTIFICATION SHALL MATCH PANELBOARD SCHEDULES.		
3.2	ALL LOCATIONS OF EQUIPMENT, PANELS ETC. ARE SHOWN FOR ILLUSTRATION PURPOSES. CONTRACTOR SHALL VERIFY AND COORDINATE EXACT LOCATION AND SIZE WITH ALL SUBCONTRACTORS AND EQUIPMENT SUPPLIERS PRIOR TO ANY INSTALLATION AND THEN INSTALL AS SUCH WITH CORRESPONDING CONDUIT STUB-UPS.		
3.3	SEE OTHER DISCIPLINE DRAWINGS FOR COORDINATION OF ALL DRAWINGS. ANY CONFLICTS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION AND MOVEMENT OF CONDUITS OR OTHER ELECTRICAL EQUIPMENT SHALL BE ACCOMPLISHED WITHOUT ANY ADDITIONAL COST FOR THE OWNER.		

3.4	THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONDUIT AND WIRING INSTALLATION FOR ALL VENDOR PROVIDED EQUIPMENT (PACKAGE SYSTEMS). IF THE SHOP DRAWINGS DIFFER FROM THE DESIGNED FACILITIES, THE CONTRACTOR SHALL REDESIGN THE FACILITIES AND SUBMIT THE REVISED DESIGN FOR THE ENGINEER'S APPROVAL ALONG WITH THE SHOP DRAWINGS. THERE SHALL BE NO ADDITIONAL COST TO THE OWNER FOR THE REDESIGN NOR FOR ANY ADDITIONAL CONDUITS AND WIRING. DURING SUBMITTAL THE CONTRACTOR SHALL VERIFY ALL SUPPLIED BREAKER SIZES FOR ALL PACKAGED SYSTEMS SUCH AS HVAC, EXHAUST FANS, MIXERS, CHEMICAL PUMPS ETC. AND MODIFY ALL BREAKERS IN MCC'S AND PANELBOARDS ACCORDINGLY WITHOUT ANY ADDITIONAL COST TO THE OWNER.								
3.5	CONTRACTOR SHALL RESTORE SIDEWALKS, ROADWAYS, SOD AND SPRINKLER SYSTEM PIPING TO MATCH EXISTING, AFTER THE COMPLETION OF THE CONDUIT AND PULLBOX INSTALLATION.								
3.6	ELECTRICAL EQUIPMENT SHALL BE DEFINED AS ANY ELECTRICAL DEVICE USED IN CONJUNCTION WITH OTHER EQUIPMENT REQUIRING ELECTRICITY FOR OPERATION. THIS INCLUDES BUT IS NOT LIMITED TO: DISCONNECT SWITCHES, JUNCTION BOXES, PANELBOARDS, TRANSFORMERS, LIGHTING FIXTURES, MOTOR STARTERS, SWITCHGEAR, MOTOR CONTROL CENTERS, CONTROLS, LOCAL CONTROL PANELS.								
3.7	ALL REFERENCES TO STAINLESS STEEL (SS) SHALL MEAN TYPE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.								
3.8	ALL ELECTRICAL EQUIPMENT OUTDOORS OR IN DESIGNATED CORROSIVE AREAS SHALL BE NEMA 4X 316 STAINLESS STEEL OR NON-METALLIC (FRP).								
3.9	OUTDOOR LIGHTING FIXTURES SHALL BE COPPER FREE ALUMINUM.								
3.10	CONTRACTOR SHALL PROVIDE AS PART OF THE ELECTRICAL SUBMITTAL, A LAYOUT OF THE ELECTRICAL ROOM SHOWING SIZES OF ALL EQUIPMENT INCLUDING LIGHTING, AND HVAC WITH THEIR SPATIAL RELATIONSHIPS.								
3.11	CONTRACTOR SHALL PROVIDE AND INSTALL WIRE ID TAGS ON ALL WIRING THAT INTERFACES WITH OTHER EQUIPMENT. INSTRUMENTATION WIRING SHALL USE SIGNAL ID TAG FROM I/O LIST UNLESS OTHERWISE NOTED.								
4.0	Operation and Maintenance Manuals								
4.1	CONTRACTOR SHALL PROVIDE AN OPERATION AND MAINTENANCE MANUAL PER SPECIFICATIONS INCLUDING: 1. SUBMITTAL DATA STATING EQUIPMENT RATING AND SELECTED OPTION FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE. 2. OPERATION AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED 3. NAMES AND ADDRESSES OF AT LEAST ONE QUALIFIED SERVICE AGENCY								
4.2	SEE SPECIFICATIONS FOR ADDITIONAL DETAILS								
5.0	Project Coseout								
5.1	CONTRACTOR SHALL PROVIDE RECORD DRAWINGS TO THE OWNER AND ENGINEER WITHIN 30 DAYS OF PUMP STATION ACCEPTANCE. THESE SHALL INCLUDE PER FBC EC C405.7.4.1:								
5.2	A LAMINATED AND FRAMED MINIMUM 11X17 INCH SINGLE LINE DIAGRAM OF THE SITE ELECTRICAL SYSTEM SHALL BE PROVIDED FOR INSTALLATION ADJACENT TO THE MAIN ELECTRICAL GEAR.								
5.3	PLAN VIEWS OF COMPLETE PUMP STATION								
6.0	Raceways								
6.1	CONDUITS RUN IN PARALLEL: INSTRUMENTATION CONDUITS SHALL HAVE A MINIMUM SEPARATION FROM POWER CONDUITS AS INDICATED IN TABLE WHETHER CONCRETE ENCASED DUCT BANKS, DIRECT BURIED, SURFACE OR RACKS: <table border="1"> <thead> <tr> <th>VOLTAGE</th> <th>DISTANCE</th> </tr> </thead> <tbody> <tr> <td>4160V</td> <td>3 FT</td> </tr> <tr> <td>480V</td> <td>2 FT</td> </tr> <tr> <td>120V</td> <td>1 FT</td> </tr> </tbody> </table>	VOLTAGE	DISTANCE	4160V	3 FT	480V	2 FT	120V	1 FT
VOLTAGE	DISTANCE								
4160V	3 FT								
480V	2 FT								
120V	1 FT								
6.2	NOT ALL CONDUITS SHOWN ON RISER AND ONE-LINE DIAGRAMS ARE SHOWN ON BUILDING LAYOUTS. CONTRACTOR SHALL SUPPLY ALL CONDUITS AND CABLES AS SHOWN ON RISERS AND ONE-LINE DIAGRAMS.								
6.3	EXPOSED RUNS OF CONDUITS SHALL BE INSTALLED WITH RUNS PARALLEL OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS OR INTERSECTIONS OF VERTICAL PLANES AND CEILINGS, WITH RIGHT ANGLE TURNS CONSISTING OF SYMMETRICAL BENDS OR PULL BOXES AS INDICATED ON THE DRAWINGS. BENDS AND OFFSETS SHALL BE AVOIDED WHERE POSSIBLE.								
6.4	THE DRAWINGS ARE NOT INTENDED TO SHOW THE EXACT LOCATION OF CONDUIT RUNS. THESE ARE TO BE COORDINATED WITH THE OTHER TRADES SO THAT CONFLICTS ARE AVOIDED PRIOR TO INSTALLATIONS.								
6.5	CONTRACTOR SHALL CORE DRILL, WHERE NECESSARY, CONCRETE WALLS, FLOORS, MANHOLES, HAND HOLES AND PULL BOXES FOR CONDUIT PENETRATIONS. SEAL PENETRATIONS WITH NON-SHRINK GROUT OR APPROPRIATE FIRE RATED DEVICES WHERE APPLICABLE.								

6.6	ALL CONDUITS PENETRATING RATED FIRE WALLS OR RATED FIRE FLOORS SHALL BE INSTALLED WITH U.L. APPROVED DEVICES AND OR FIRE RATED SEALING COMPOUND TO MAINTAIN THE FIRE RATING OF THE WALL OR FLOOR PENETRATED.		
6.7	PROVIDE CONDUIT DUCT SEAL AT ALL CONDUIT ENDS.		
6.8	ALL SPARE, ABANDONED, OR EMPTY CONDUITS SHALL BE SEALED WITH A CAP AT BOTH ENDS AND A PULL STRING INSTALLED WITH IDENTIFICATION OF OTHER END LOCATION AT BOTH ENDS.		
6.9	FLEXIBLE CONDUITS SHALL BE USED TO TERMINATE ALL MOTORS AND OTHER VIBRATING EQUIPMENT AND SHALL BE BETWEEN 18" AND 36" IN LENGTH.		
6.10	ALL METALLIC CONDUITS BELOW GRADE TO A MINIMUM ELEVATION OF 12 INCHES ABOVE GRADE SHALL BE PVC COATED RIGID METAL CONDUIT (RMC).		
6.11	ALL METALLIC CONDUITS 12 INCHES AND GREATER ABOVE GRADE SHALL BE RMC.		
6.12	ALL REFERENCES TO RMC SHALL MEAN ALUMINUM CONDUIT UNLESS OTHERWISE NOTED. (SEE 6.13 THRU 6.15)		
6.13	ALL REFERENCES TO PVC COATED RMC SHALL MEAN PVC COATED RIGID ALUMINUM UNLESS OTHERWISE NOTED OR USED FOR ANALOG SIGNALS.		
6.14	ALUMINUM AND PVC TYPE CONDUITS SHALL NOT BE USED FOR ANALOG INSTRUMENTATION WIRING.		
6.15	ANALOG INSTRUMENTATION CONDUITS SHALL BE RIGID GALVANIZED STEEL (RGS) OR PVC COATED RGS. ALUMINUM CONDUIT NOT ACCEPTED.		
6.16	ALL PVC CONDUIT FOR THIS PROJECT SHALL BE SCH.80.		
6.17	ALL RMC CONDUITS THAT CONTACT CONCRETE SHALL BE PVC COATED.		
6.18	ALL CONDUIT FITTINGS MATERIALS SHALL MATCH ASSOCIATED CONDUIT MATERIAL.		
7.0	Duct Banks & Manholes		
7.1	LOCATIONS OF MANHOLES, HANDHOLES AND PULL BOXES ARE APPROXIMATE. CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH EXISTING AND NEW PIPING OR CONDUIT AND ADJUST ACCORDINGLY.		
7.2	COLORLED WARNING TAPE 6" WIDE SHALL BE INSTALLED 8" BELOW FINISHED GRADE DIRECTLY ABOVE ALL UNDERGROUND YARD CONDUITS ACCORDING TO THE FOLLOWING SCHEDULE: <table border="1"> <tbody> <tr> <td>POWER: RED</td> </tr> <tr> <td>ALL OTHER CONDUITS: GREEN</td> </tr> </tbody> </table>	POWER: RED	ALL OTHER CONDUITS: GREEN
POWER: RED			
ALL OTHER CONDUITS: GREEN			
7.3	POWER: RED		
7.4	ALL OTHER CONDUITS: GREEN		
7.5	ALL EXCAVATIONS FOR CONDUITS, HANDHOLES, MANHOLES AND PULLBOXES NEAR EXISTING PIPING, CONDUIT AND EQUIPMENT SHALL BE HAND EXCAVATED AND COORDINATED WITH PLANT ENGINEER AT JEA.		
7.6	MINIMUM DEPTH FROM TOP OF DUCT BANKS OR CONDUITS TO FINISHED GRADE SHALL BE 24" UNLESS OTHERWISE NOTED.		
7.7	IF CONCRETE ENCASED DUCT BANKS INCLUDE POWER WITH ANY TYPE OF SIGNALS EXCEPT FIBER OPTIC CABLE, ALL CONDUITS SHALL BE METALLIC.		
7.8	CONCRETE DUCT BANKS WITH POWER ONLY WIRING MAY BE PVC UNLESS OTHERWISE NOTED ON THE DRAWINGS.		
7.9	SLOPE DUCT BANKS A MINIMUM 3 INCHES PER 100 FEET DOWN AWAY FROM BUILDINGS.		
7.10	DUCT BANK CONCRETE SHALL BE MINIMUM CLASS C 2500 PSI		
8.0	Conductors		
8.1	ALUMINUM CONDUCTORS SHALL NOT BE USED FOR THIS PROJECT.		
8.2	CONDUCTOR PULLING TENSIONS SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL INSTALL PULL BOXES TO MEET MANUFACTURER'S REQUIREMENTS.		
8.3	POWER CONDUCTORS USED AT A VOLTAGE GREATER THAN 240V TO GROUND SHALL BE XHHW-2 STRANDED COPPER. OTHER POWER WIRING SHALL BE EITHER XHHW OR THWN STRANDED COPPER WIRING.		
8.4	BRANCH CIRCUITS EXCEEDING 100 FT IN LENGTH SHALL BE WIRED WITH MINIMUM #10 AWG COPPER WIRES. CONTRACTOR SHALL VERIFY REQUIRED WIRE SIZE WITH VOLTAGE DROP CALCULATIONS.		
9.0	Boxes		
9.1	ALL ENCLOSURES, TJB, WIREWAY, PULL BOXES ETC. SHALL CONTAIN A GROUNDING BUS. CONNECT ALL RACEWAY BONDS TO THIS BUS VIA GROUNDING BUSHING AND EXTEND BONDING JUMPER FROM THIS BUS TO THE ENCLOSURE.		
9.2	ALL JUNCTIONS BOXES, LOCAL CONTROL PANELS, DISCONNECT SWITCHES AND INSTALLATION HARDWARE INSTALLED OUTDOORS SHALL BE 316 STEEL.		
10.0	Panels		

10.1	ALL CONTROL PANELS SHALL BE CONSTRUCTED BY A UL 508A APPROVED PANEL VENDOR AND SHALL BEAR A UL 508A LABEL ON THE PANEL.
10.2	TYPEWRITTEN AND LAMINATED PANEL SCHEDULES SHALL BE INSTALLED IN EACH PANELBOARD, AND TYPEWRITTEN TERMINAL BLOCK SCHEDULES IN EACH CONTROL CABINET.
10.3	ALL PANELBOARDS SHALL INCLUDE AN INTEGRAL FACTORY INSTALLED SURGE PROTECTION DEVICES (SPD AKA TVSS).
10.4	CONTRACTOR SHALL BALANCE PANELBOARD LOADS AT THE END OF THE PROJECT.
11.0	Grounding
11.1	GROUNDING SHALL BE INSTALLED IN ACCORDANCE WITH NEC, ARTICLE 250. THE GROUNDING SYSTEM TEST SHALL NOT EXCEED A 48 HOUR SPAN DRY RESISTANCE OF 10 OHMS. ADDITIONAL GROUNDING TO MEET THIS REQUIREMENT SHALL BE INSTALLED AT NO EXTRA COST. GROUNDING AND BONDING CONNECTIONS SHALL NOT BE PAINTED. ALL GROUNDING CONNECTIONS SHALL BE EXOTHERMIC UNLESS SPECIFICALLY INDICATED OTHERWISE.
11.2	AN EQUIPMENT GROUND WIRE SIZED PER NEC SHALL BE PULLED IN ALL ELECTRICAL CONDUITS, POWER AND CONTROL, WHETHER OR NOT INDICATED ON THE PLANS.
11.3	ALL ELECTRICAL EQUIPMENT SHALL BE CONNECTED TO GROUNDING COUNTERPOISE.
12.0	Instrumentation
12.1	INSTRUMENTATION IS LOW VOLTAGE SIGNALS SUCH AS 4-20MA, TELEPHONE COMMUNICATION, FIRE ALARM COMMUNICATION. POWER CONDUITS SHALL ONLY CROSS INSTRUMENTATION CONDUIT PERPENDICULARLY AT RIGHT ANGLES WITH 6" SEPARATION.
12.2	THE POWER AND SIGNAL SIDES OF ALL EXTERIOR INSTALLED INSTRUMENTATION SHALL HAVE SURGE PROTECTION AND SHALL BE GROUNDED TO A SEPARATE GROUND ROD AT THE INSTRUMENT.
12.3	INSTRUMENTATION GROUND SHALL BE A #6 AWG COPPER CONNECTED TO THE GROUND GRID OR CONNECTED TO A DRIVEN GROUND. #6 GROUND WIRE SHALL BE INSTALLED IN CONDUIT WHERE EXPOSED. GROUND RODS SHALL BE 5/8" OR 3/4" BY A MINIMUM OF 20' IN LENGTH, AS INDICATED ON THE DRAWINGS.
12.4	CONTRACTOR SHALL INSTALL A SWITCH TO DISCONNECT POWER AT EACH FOUR WIRE INSTRUMENT.
13.0	Signage
13.1	CONTRACTOR SHALL PROVIDE SIGNAGE PER NEC 110.24 AND NEC 702.7 AT THE SERVICE ENTRANCE EQUIPMENT.
13.2	CONTRACTOR SHALL PROVIDE SIGNAGE PER NFPA 110 FOR THE EMERGENCY SHUT-OFF BUTTON LOCATED ON THE NORTH EAST OUTSIDE CORNER OF THE ELECTRICAL BUILDING.
13.3	CONTRACTOR SHALL PROVIDE SIGNAGE PER NFPA 704 FOR THE FUEL SUPPLY.
13.4	CONTRACTOR SHALL PROVIDE AND INSTALL ARC-FLASH HAZARD WARNING LABELS PER NEC 110.16 AND 110.21. THESE RULES APPLY AS A MINIMUM TO SWITCHBOARDS, SWITCHGEAR, PANELBOARDS, MOTOR CONTROL CENTERS, INDUSTRIAL CONTROL PANELS, METER SOCKET ENCLOSURES, AND ENCLOSED CIRCUIT BREAKERS.
14.0	Electrical Devices (Sw and Recp)
14.1	ALL RECEPTACLES SHALL BE INSTALLED 18" AFF UNLESS OTHERWISE NOTED. LIGHT SWITCHES SHALL BE MOUNTED 48" AFF UNLESS OTHERWISE NOTED.
14.2	ALL RECEPTACLES WITHIN 6' OF A SINK SHALL BE GFI.
14.3	CONTRACTOR SHALL PROVIDE, INSTALL, TERMINATE AND TEST NEW STATION TELEMETRY EQUIPMENT.

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 Date: 2022/05/22 11:59 AM

DESIGNED	JMB
DRAWN	TB
CHECKED	JCB
PROJ. ENGR.	JMW
JOHN C. BURKE	P.E.
No. 17301	

NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
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1	07/22	100% SUBMITTAL	GAB

SCALE	AS NOTED
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Hazen
 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

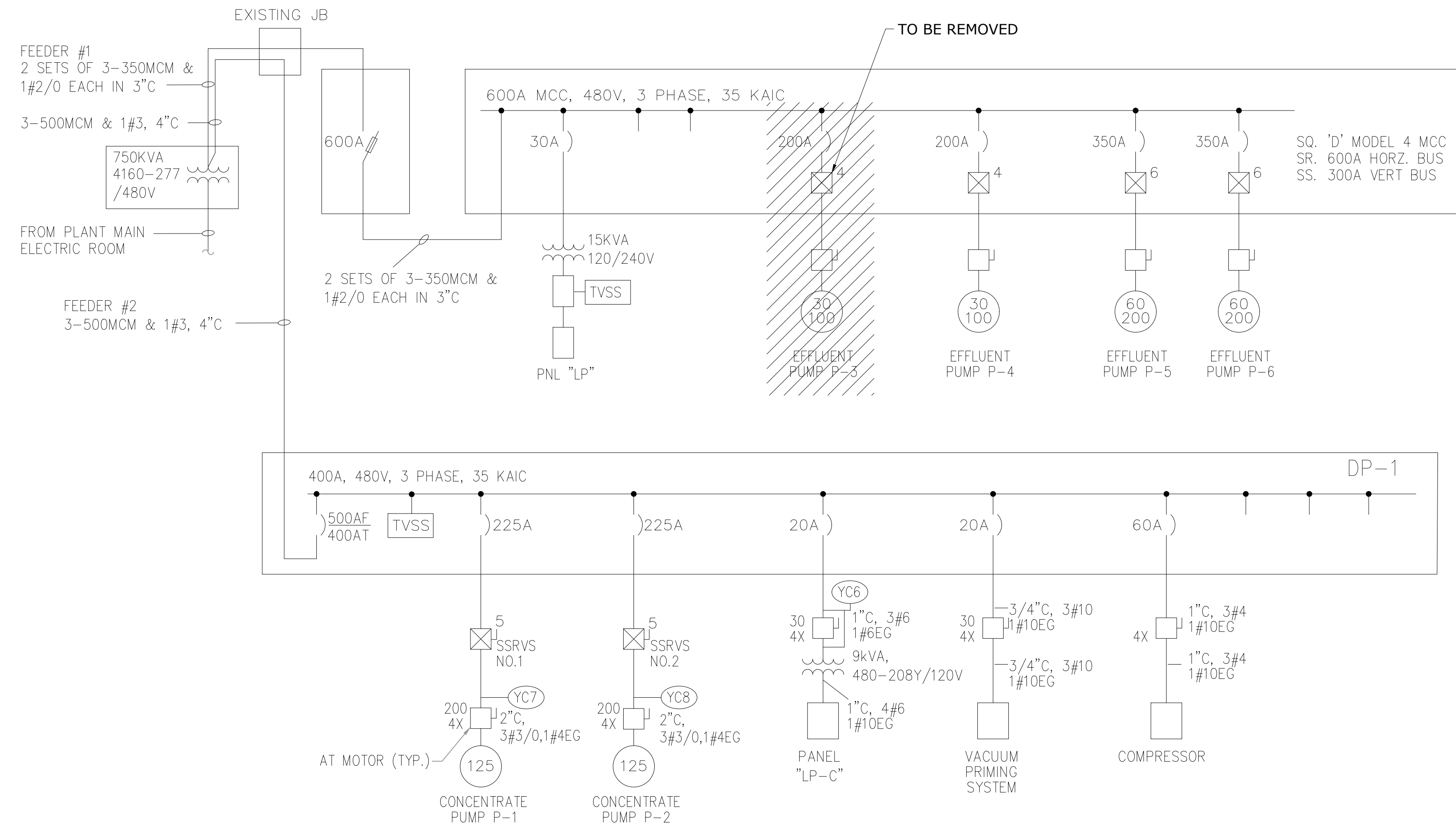
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COOPER CITY
 CITY OF Cooper City
 Someplace Special

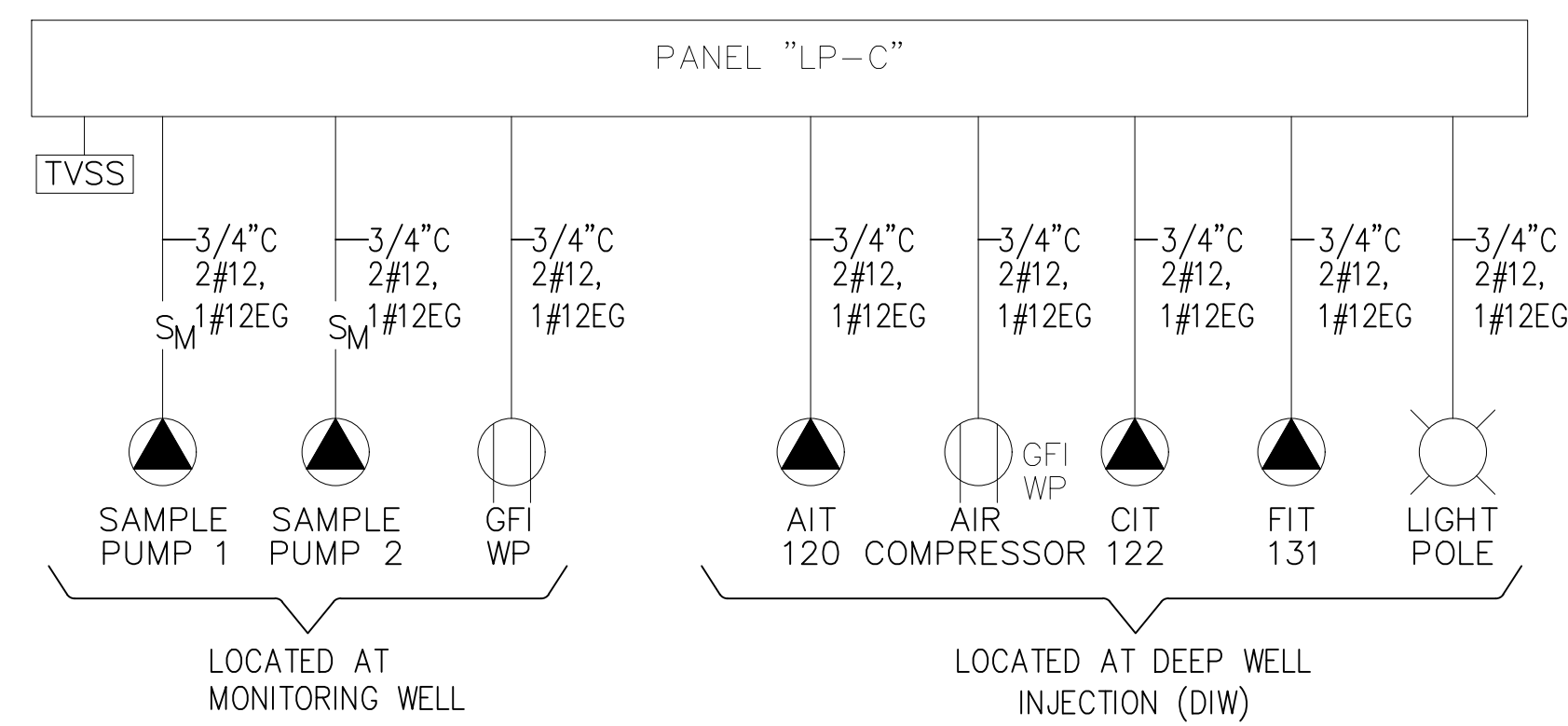
COOPER CITY UTILITIES DEPARTMENT	DATE: MAY 2023
EFFLUENT PUMP REPLACEMENT	SHEET: 14 OF 22
GENERAL ELECTRICAL NOTES	DRAWING: E-02

DATE:	MAY 2023
SHEET:	14 OF 22
DRAWING:	E-02

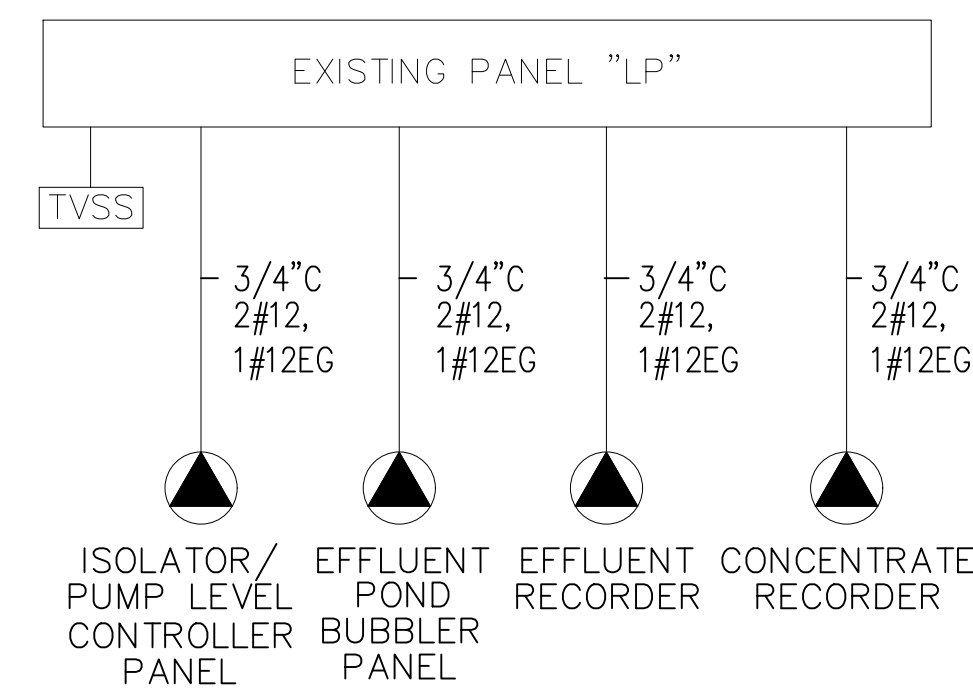
BID SET



EXISTING SINGLE LINE DIAGRAM/RISER MODIFICATIONS
NOT TO SCALE



PANELBOARD "LP-C" RISER DIAGRAM



EXISTING PANELBOARD "LP" RISER DIAGRAM

TRANSFORMER LOAD SUMMARY

DESCRIPTION	CONNECTED LOAD	RUNNING LOAD
FEEDER #1		
EXISTING MCC	850A	470A
FEEDER #2		
PANEL DP-1		326A
TOTAL		796A

EXISTING 750 KVA TRANSFORMER
AMPACITY @480V, 3Ø, 903A

FEEDER #2 CALCULATION

	RUNNING LOAD
PANEL DP-1	326A
TOTAL	326A
25% OF LARGEST MOTOR	39A
FEEDER #2 TOTAL	365A

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NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
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DESIGNED	JMB
DRAWN	TB
CHECKED	JCB
PROJ. ENGR.	JMW

JOHN C. BURKE	P.E.
No. 17301	

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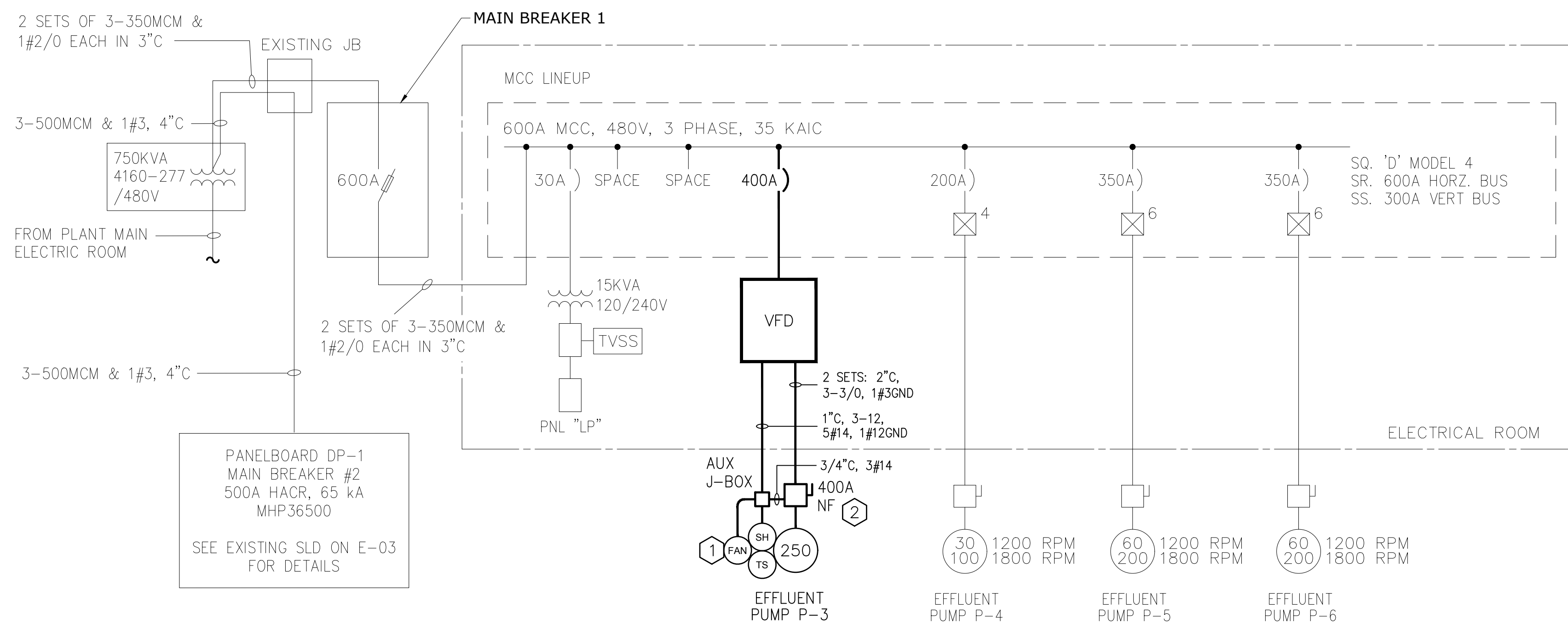
SCALE	AS NOTED
CLIENTS PROJECT:	-
ENGINEERS PROJECT:	4679-004
CAD REFERENCE:	4679-004-E03.dwg

COOPER CITY
CITY OF Cooper City
Someplace Special

COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
EXISTING SINGLE LINE DIAGRAM & RISER DIAGRAMS

DATE:	MAY 2023
SHEET:	15 OF 22
DRAWING:	E-03

BID SET



PROPOSED SINGLE LINE DIAGRAM MODIFICATIONS
NOT TO SCALE

NOTES

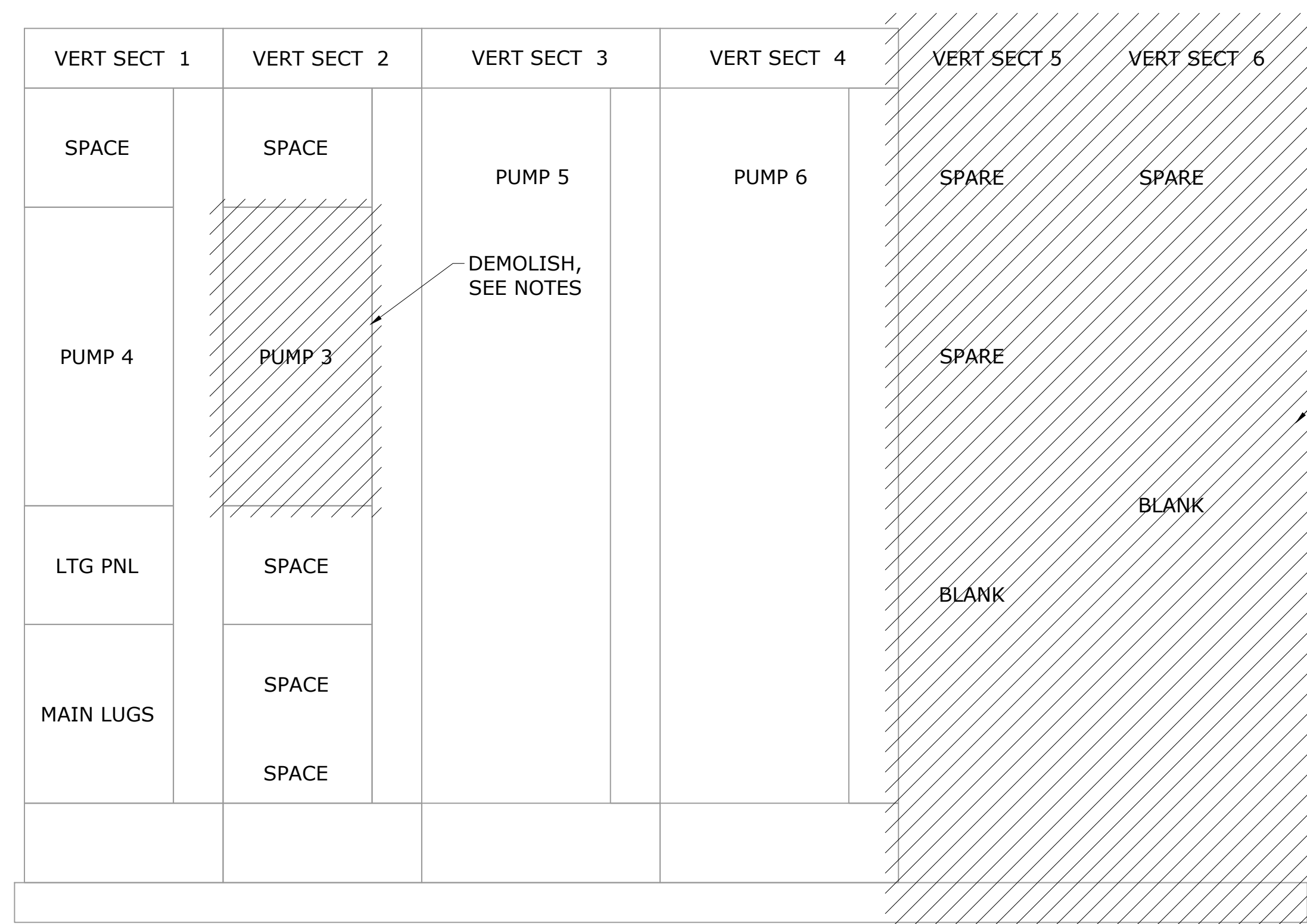
- CONTRACTOR SHALL COORDINATE POWER DOWN TIME WITH PLANT SUPERVISOR FOR REMOVING EXISTING MCC SECTIONS 5 & 6. DELIVER MCC SECTIONS TO OWNER FOR DISPOSAL.
- CONTRACTOR SHALL PROVIDE AND INSTALL A NEW VFD IN NEMA 12 ENCLOSURE FOR NEW 250HP PUMP. LABEL VFD AS "EFFLUENT PUMP NO.3".
- CONTRACTOR SHALL DEMOLISH EXISTING MCC PUMP P-3 CUBICLE AND SHALL PROVIDE AND INSTALL A NEW 400A CIRCUIT BREAKER / CUBICLE. PROVIDE AND INSTALL A NEW BLANK COVER FOR UNUSED SPACE.
- CONTRACTOR SHALL DEMOLISH EXISTING PUMP #3, SIX POLE DISCONNECT ADJACENT TO EXISTING PUMP LOCATION. CONTRACTOR SHALL PROVIDE AND INSTALL A NEW 400A, 480V, 3 POLE W/GND, NEMA 4X SS DISCONNECT SWITCH AT PUMP.

KEYED NOTES:

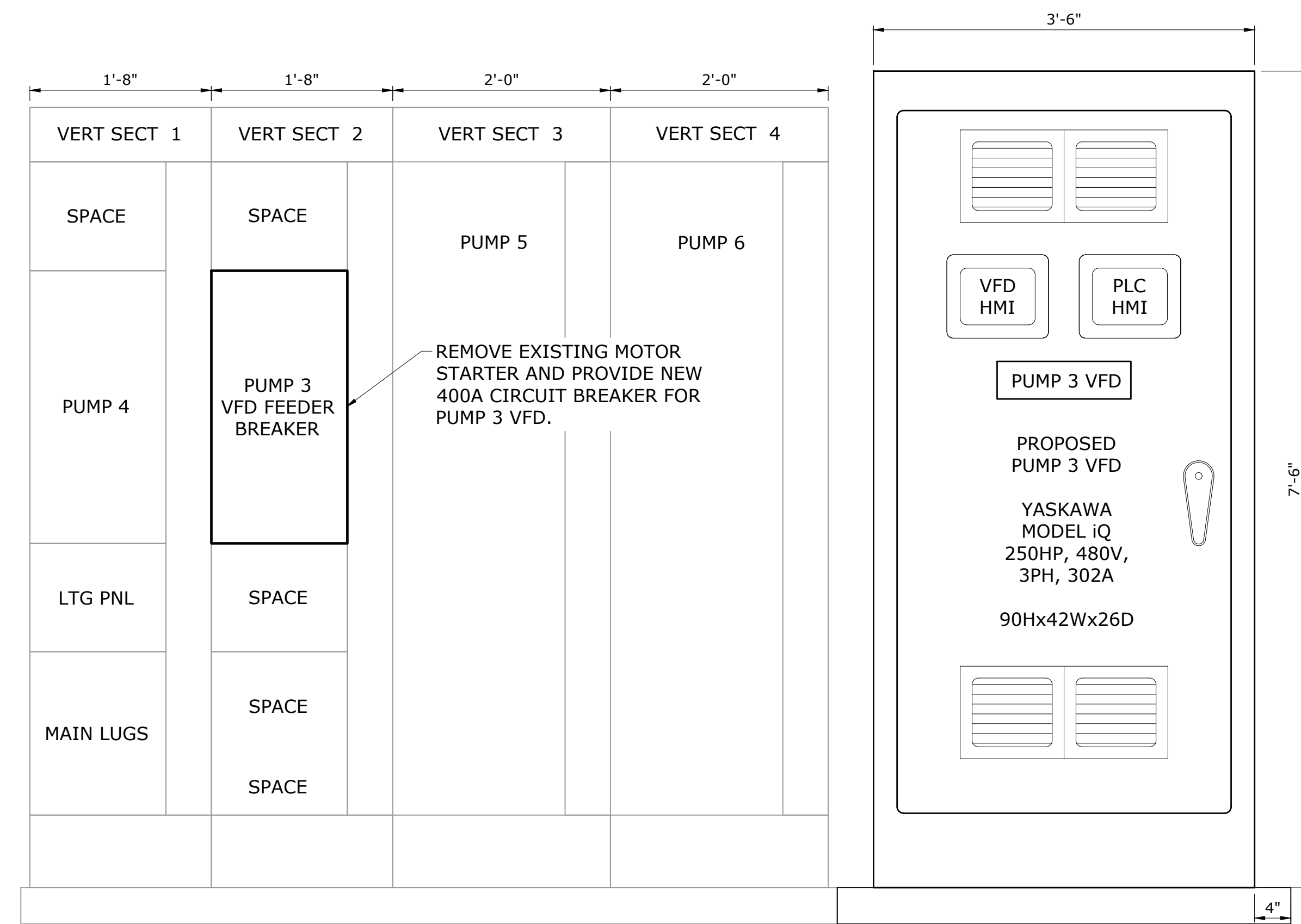
- MOTOR AUXILIARY COOLING FAN SHALL BE CONTROLLED FROM THE VFD. SEE MOTOR AND VFD SPECIFICATIONS FOR DETAILS. MOTOR AUXILIARY COOLING FAN VOLTAGE SHALL BE 120VAC, 1 PHASE FROM EXISTING PANEL LP. CONTRACTOR SHALL PROVIDE AND INSTALL A NEW CIRCUIT BREAKER FOR AUX FAN IN PANEL LP. CONTRACTOR SHALL PROVIDE CONDUIT AND WIRING BETWEEN PANEL LP AND THE VFD TO POWER THE AUXILIARY COOLING FAN. THE FAN WIRING SHALL EXTEND FROM THE VFD TO THE PUMP AUXILIARY FAN VIA CONTROL CONDUIT AS SHOWN ON DRAWING E-04 AND E-09.
- PUMP DISCONNECT SHALL INCLUDE FORM "C" AUXILIARY CONTACTS.

COOPER CITY EFFLUENT PUMPS STATION ELECTRICAL LOAD CALCULATIONS

LOAD DESCRIPTION	CONNECTED kVA	CONNECTED AMPS	OPERATING AMPS
DISCONNECT 1 (MCC)			
PUMP 3 @ 250HP	250	302	
PUMP 4 @ 100HP	100	124	
PUMP 5 @ 200HP	200	240	216
PUMP 6 @ 200HP	200	240	216
LCP AUXILIARY LOADS (15kVA)	15	18	60
25% OF LARGEST MOTOR LOAD	63	76	
TOTALS @ 480V, 3PH	828	1000	492
DISCONNECT 2 (DP1)			
CONCENTRATE PUMP 1 @ 125HP	125	156	140
CONCENTRATE PUMP 2 @ 125HP	125	156	
LCP AUXILIARY LOADS (9kVA)	9	11	9
AIR COMPRESSOR	5		
25% OF LARGEST MOTOR LOAD	31	39	-
TOTALS @ 480V, 3PH	295	362	149
AVAILABLE FAULT CURRENT:			17372 A



EXISTING MCC ELEVATION



PROPOSED MCC ELEVATION

EXTEND HOUSEKEEPING PAD AS REQUIRED TO PROVIDE APPROXIMATELY 4 INCH OVERLAP CURB AROUND THE VFD

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 User: jmb
 Date: 2022/05/25 3:49 PM
 Plot: E-04.dwg

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PROJ. ENGR.	JMW		
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2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

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DRAWN	TB		
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PROJ. ENGR.	JMW		
NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

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 HAZEN AND SAWYER
 4000 HOLLYWOOD BOULEVARD, SUITE 750N
 HOLLYWOOD, FLORIDA 33021

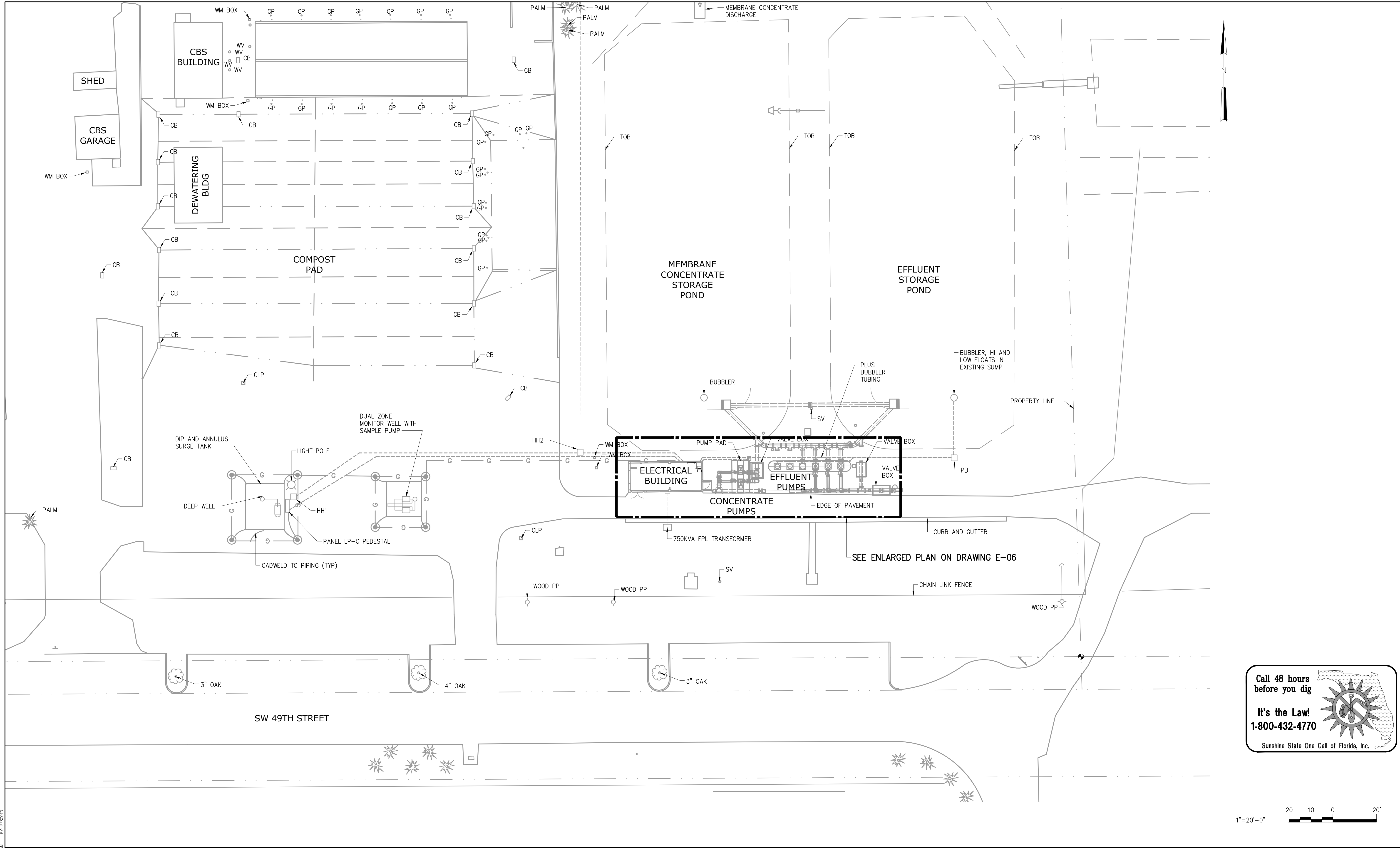
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ENGINEERS PROJECT:	4679-004
CAD REFERENCE:	4679-004-E04.dwg

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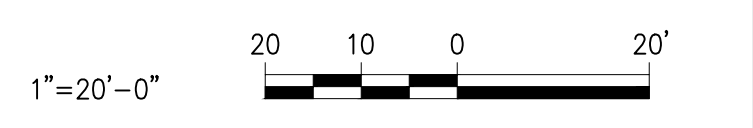
COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
PROPOSED SINGLE LINE DIAGRAM

DATE:	MAY 2023
SHEET:	16 OF 22
DRAWING:	E-04

BID SET



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1	07/22	100% SUBMITTAL	GAB

DESIGNED: **JMB**
 DRAWN: **TB**
 CHECKED: **JCB**
 PROJ. ENGR.: **JMW**

JOHN C. BURKE P.E.
 No. 17301

HAZEN AND SAWYER
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 HOLLYWOOD, FLORIDA 33021

SCALE
 1"=20'

CLIENTS PROJECT: -
 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-E05.dwg

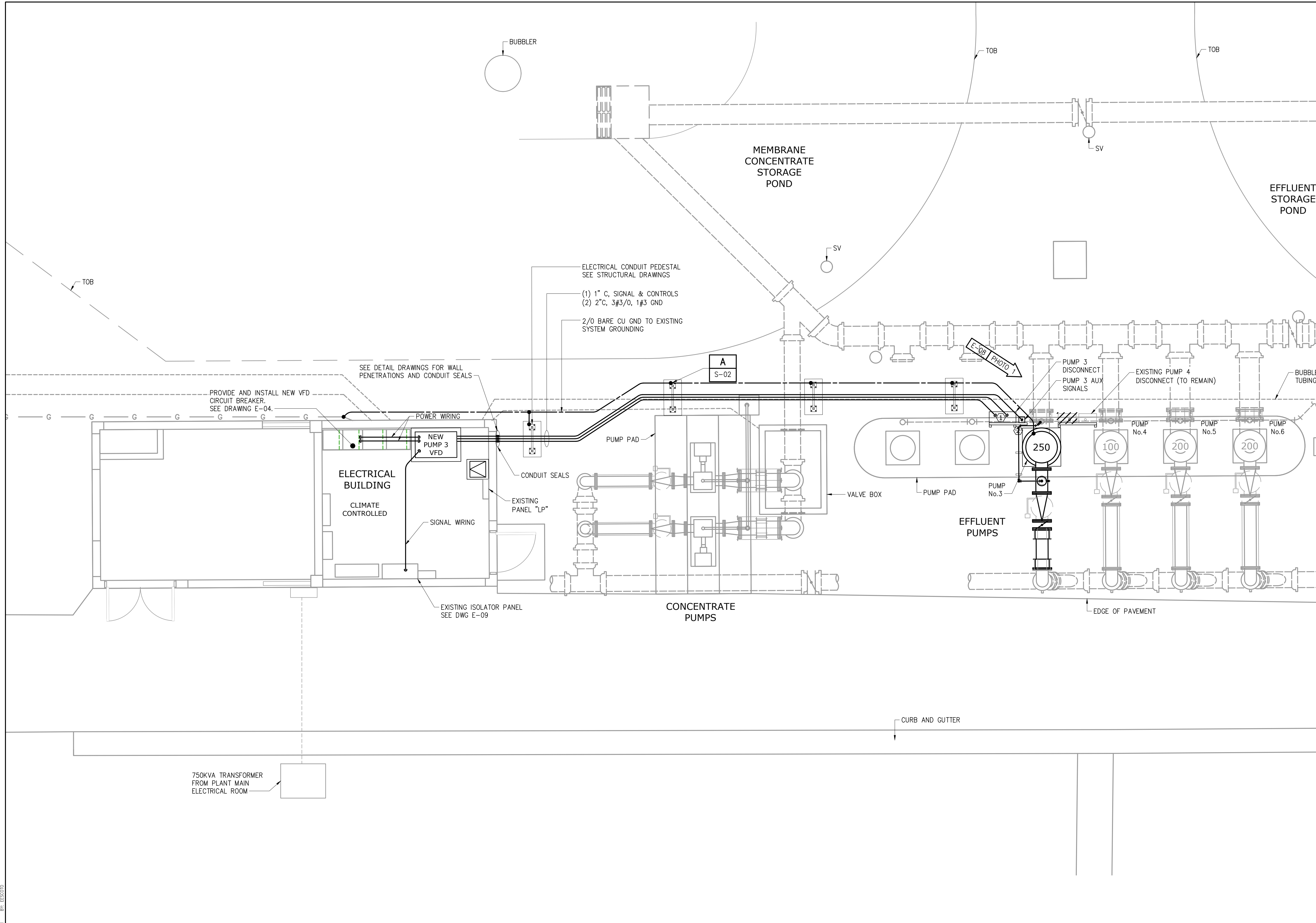
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COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
OVERALL ELECTRICAL SITE PLAN

DATE: MAY 2023
 SHEET: 17 OF 22
 DRAWING: E-05

BID SET

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 PLOT DATE: 2025/05/09 11:44:12 AM BY: E352010



NOTES:

1. WEIGHT OF THE 3 CONDUITS AND WIRE IS APPROXIMATELY 12 LBS/LF
- ① TOP CONDUIT ENTRY SHALL BE VIA WEATHER PROOF HUBS.
- ② AUXILIARY SIGNAL J-BOX SHALL BE STAINLESS STEEL, MINIMUM 6"x6"x4"D WITH GASKET AND HINGED COVER. TOP ENTRY SHALL BE VIA WEATHERPROOF HUBS.

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LEGEND

- EXISTING
- PROPOSED
- /// DEMOLISH
- ← PHOTO # | SHT DIRECTION PHOTO WAS TAKEN



NO.	DATE	ISSUED FOR	BY
3	05/23	BID SET	GAB
2	08/22	BID SET	GAB
1	07/22	100% SUBMITTAL	GAB

DESIGNED	JMB
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CHECKED	JCB
PROJ. ENGR.	JMW

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SCALE
 1"=4'

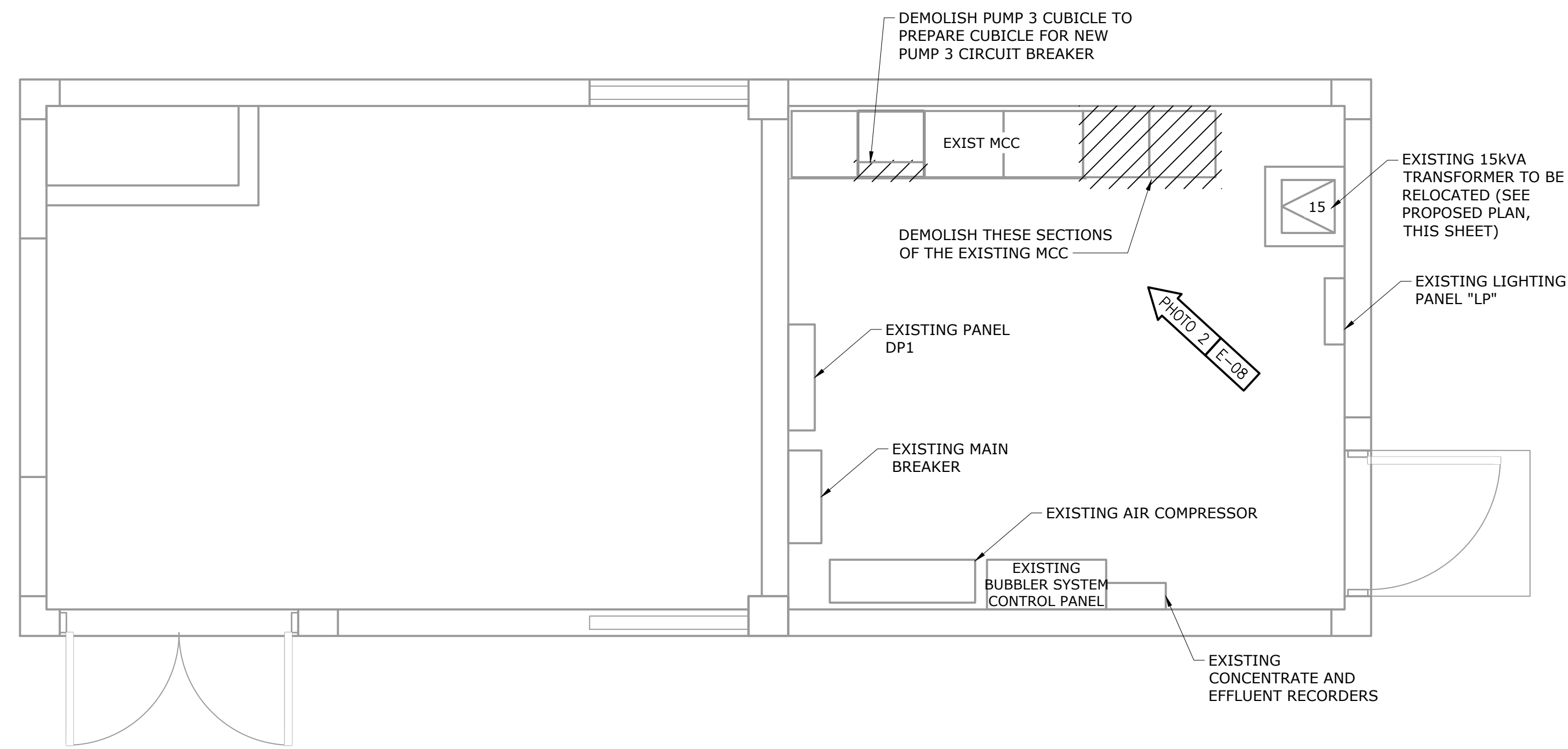
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COOPER CITY

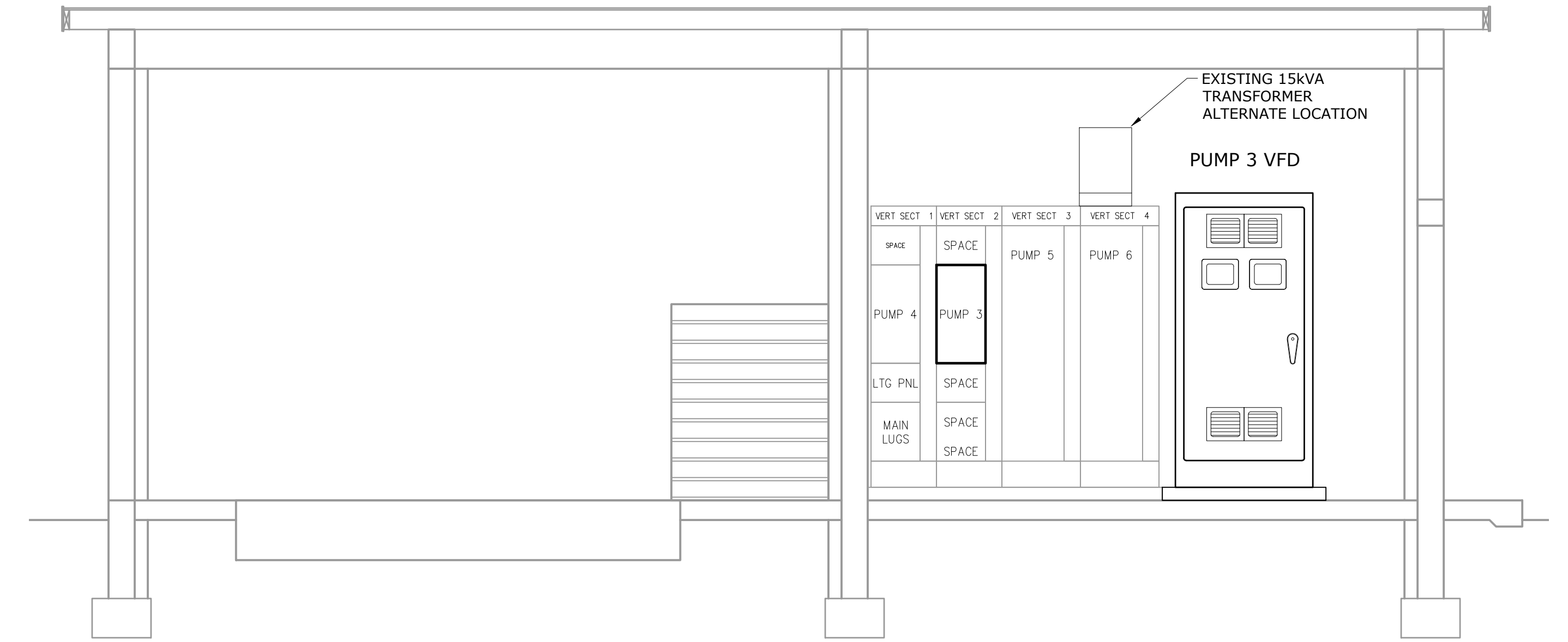
COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
ENLARGED ELECTRICAL SITE PLAN

DATE: MAY 2023
 SHEET: 18 OF 22
 DRAWING: E-06

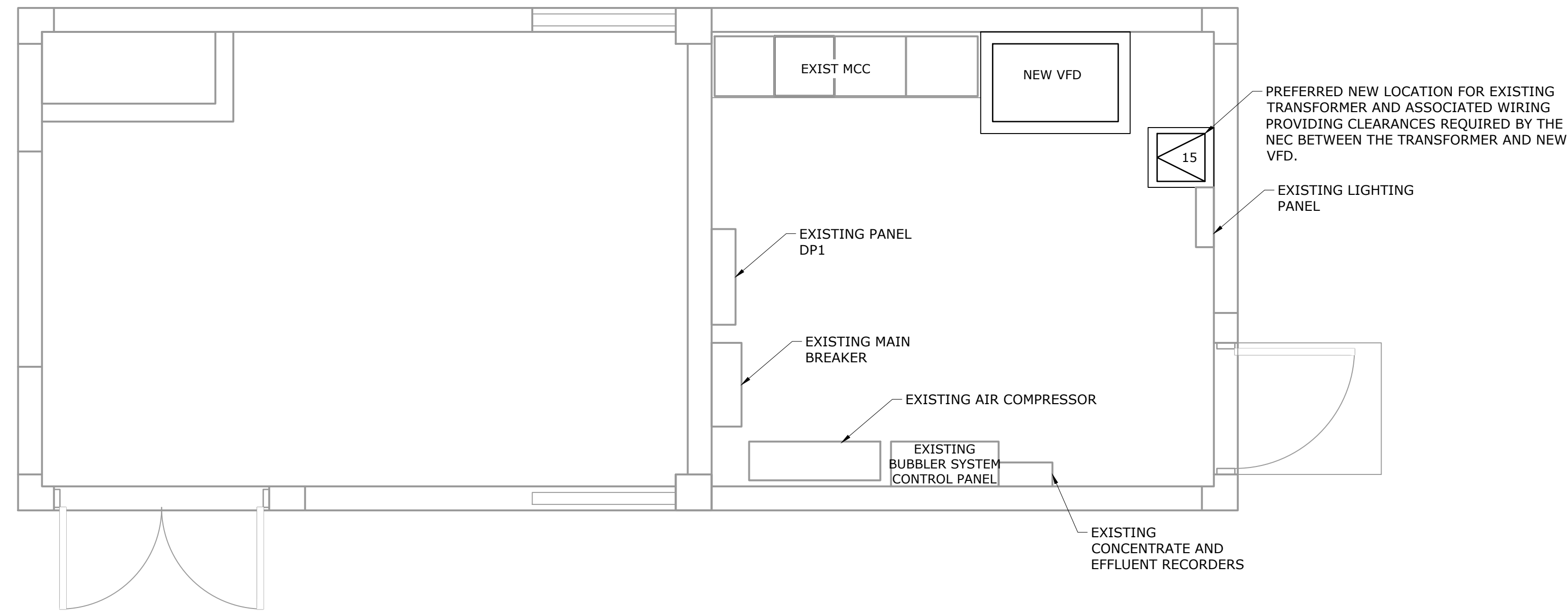
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EXISTING PLAN
3/8"=1'-0"



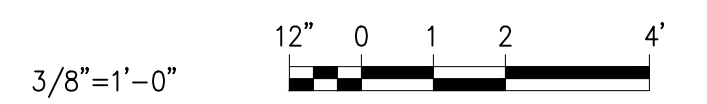
PROPOSED ELEVATION
3/8"=1'-0"



PROPOSED PLAN
3/8"=1'-0"

LEGEND

- EXISTING
- PROPOSED
- /// DEMOLISH
- ← PHOTO # | SHT DIRECTION PHOTO WAS TAKEN



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 No. 17301

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SCALE
 3/8"=1'-0"

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 ENGINEERS PROJECT: 4679-004
 CAD REFERENCE: 4679-004-E07.dwg

COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
 EFFLUENT PUMP REPLACEMENT
MCC ROOM DEMOLITION AND PROPOSED VIEWS

DATE: MAY 2023
 SHEET: 19 OF 22
 DRAWING: E-07

BID SET



PHOTO 1 – E-06

NTS



PHOTO 2 – E-07

NTS

LEGEND

////// DEMOLISH

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HOLLYWOOD, FLORIDA 33021

SCALE
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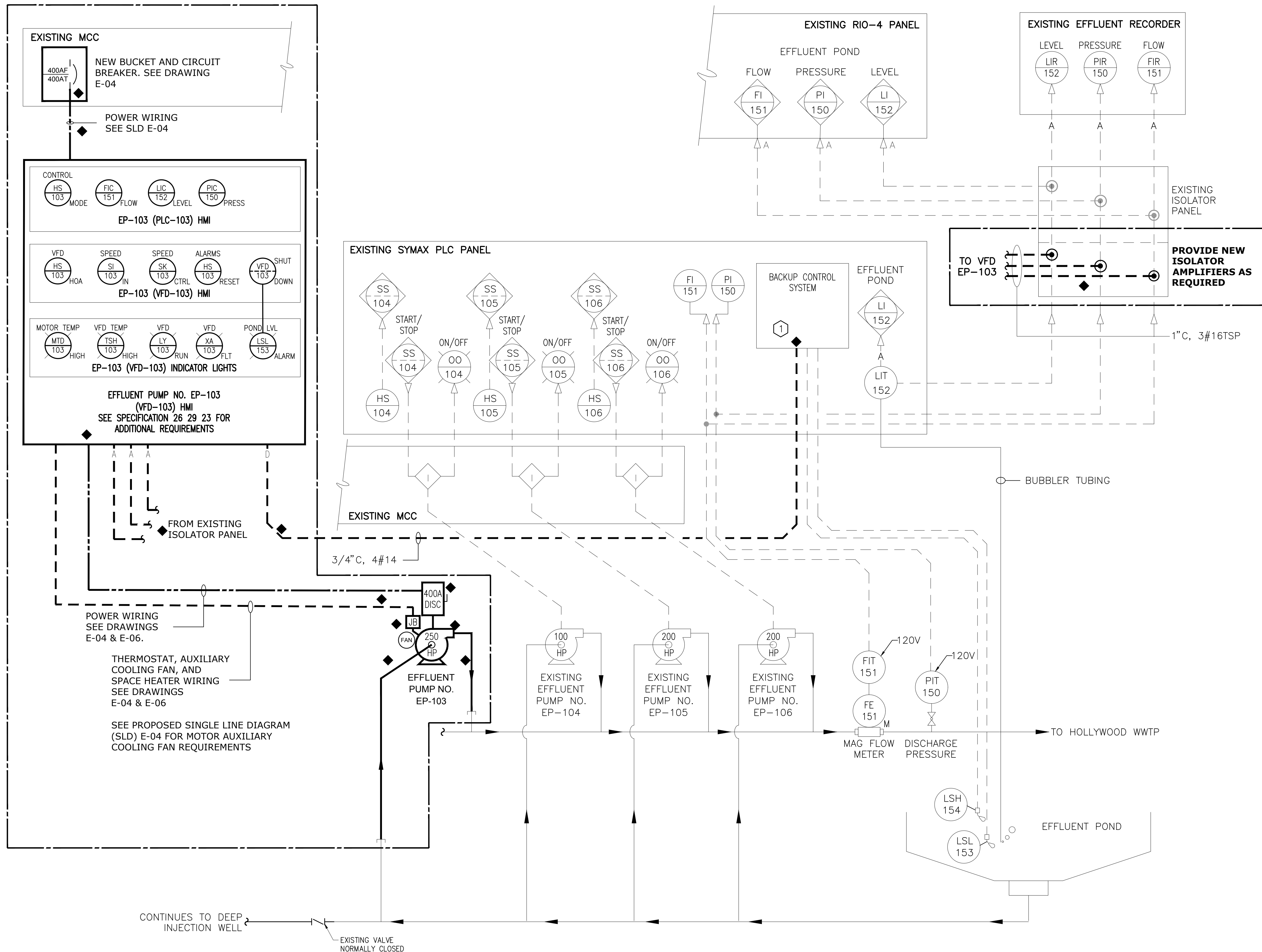
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COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
DEMOLITION PHOTOS

DATE: MAY 2023
SHEET: 20 OF 22
DRAWING: E-08

BID SET



EFFLUENT PUMP No.3 CONTROL STRATEGY:

INSTRUMENTS LIT-152, PIT-150, & FIT-151 ARE EXISTING. NEW CONDUIT, WIRING, TERMINATIONS, AND ASSOCIATED SIGNAL SPLITTER/AMPLIFIERS SHALL BE PROVIDED AND INSTALLED TO EXTEND THE SIGNALS TO THE INTEGRAL VFD PLC TO PROVIDE A COMPLETE CONTROL STRATEGY FOR EFFLUENT PUMP No.3.

THE THREE OPERATING MODES, LISTED BELOW, SHALL BE SELECTABLE VIA A SELECTOR SWITCH ON THE VFD.

THE OPERATING MODES DETAILED BELOW SHALL BE INCORPORATED INTO THE VFD VIA AN INTEGRAL VFD PLC PROVIDED AND PROGRAMMED BY THE VFD VENDOR. SETPOINTS SHALL BE COORDINATED WITH THE OWNER AND ADJUSTED BY THE CONTRACTOR.

EFFLUENT PUMP No.3 OPERATING MODES:

PRIMARY MODE:
FLOW CONTROL (FIC-151) SHALL CONTROL THE DISCHARGE FLOW BASED ON AN OPERATOR ENTERED FLOW SETPOINT DERIVED FROM FIR-151. RANGE BETWEEN 650 AND 4300 GPM.

SECONDARY #1 MODE:
LEVEL CONTROL (LIC-152) SHALL MAINTAIN THE EFFLUENT POND LEVEL BASED ON AN OPERATOR ENTERED LEVEL SETPOINT DERIVED FROM LIR-152. RANGE: _____ AND _____. **(TO BE PROVIDED BY THE OWNER DURING STARTUP AND TESTING)**

SECONDARY #2 MODE:
EFFLUENT PUMPS DISCHARGE PRESSURE CONTROL (PIC-150) SHALL MAINTAIN AN OPERATOR ENTERED SETPOINT PRESSURE DERIVED FROM PIR-150. RANGE 25 TO 100 PSI.

EFFLUENT POND LEVEL SWITCH LSL-153 SHALL MONITOR, ALARM, AND SHUTDOWN PUMP No.3.

EFFLUENT POND LEVEL SWITCH LSH-154 SHALL MONITOR AND ALARM AT THE PLANT CONSOLE.

ALL VFD SETPOINTS, RANGES, AND PARAMETERS SHALL BE CONFIGURABLE FROM THE VFD FRONT PANEL HMI OR FROM THE PLC HMI WHICHEVER IS SUPPLIED. THE VFD SHALL NOT HAVE MORE THAN ONE HMI FOR STATUS AND CONTROL.

KEYED NOTES:

- 1 CONTRACTOR SHALL MODIFY THE EXISTING BACKUP CONTROL SYSTEM TO EXTEND THE EFFLUENT POND LOW LEVEL ALARM SIGNAL DRY CONTACTS (LSL-153) TO THE EFFLUENT PUMP No.3 VFD INTEGRAL SHUTDOWN CIRCUIT.

NEW WORK

◆ ALL MODIFICATIONS PART OF THIS CONTRACT.

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No. 17301



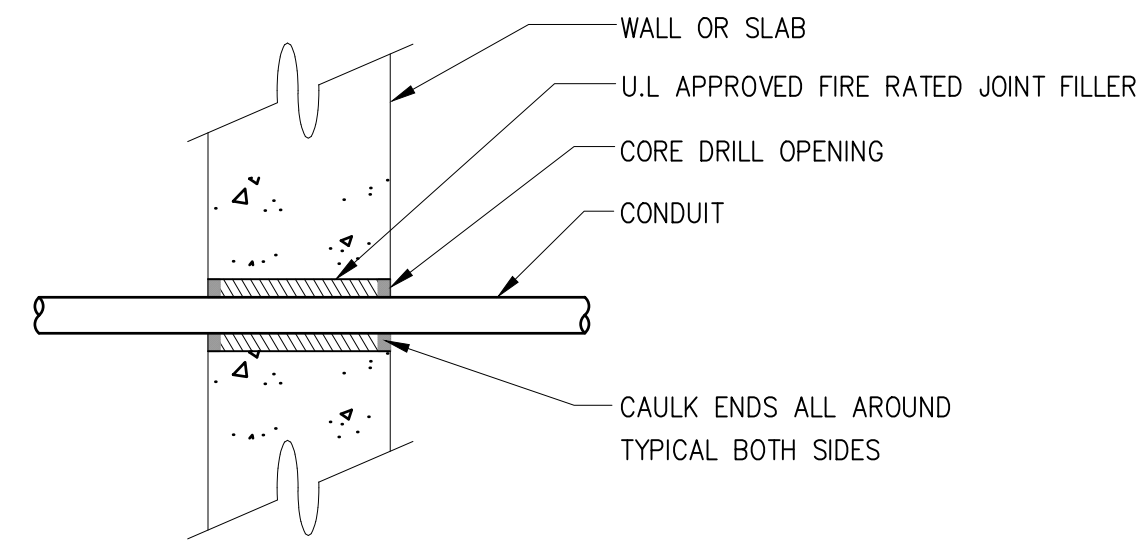
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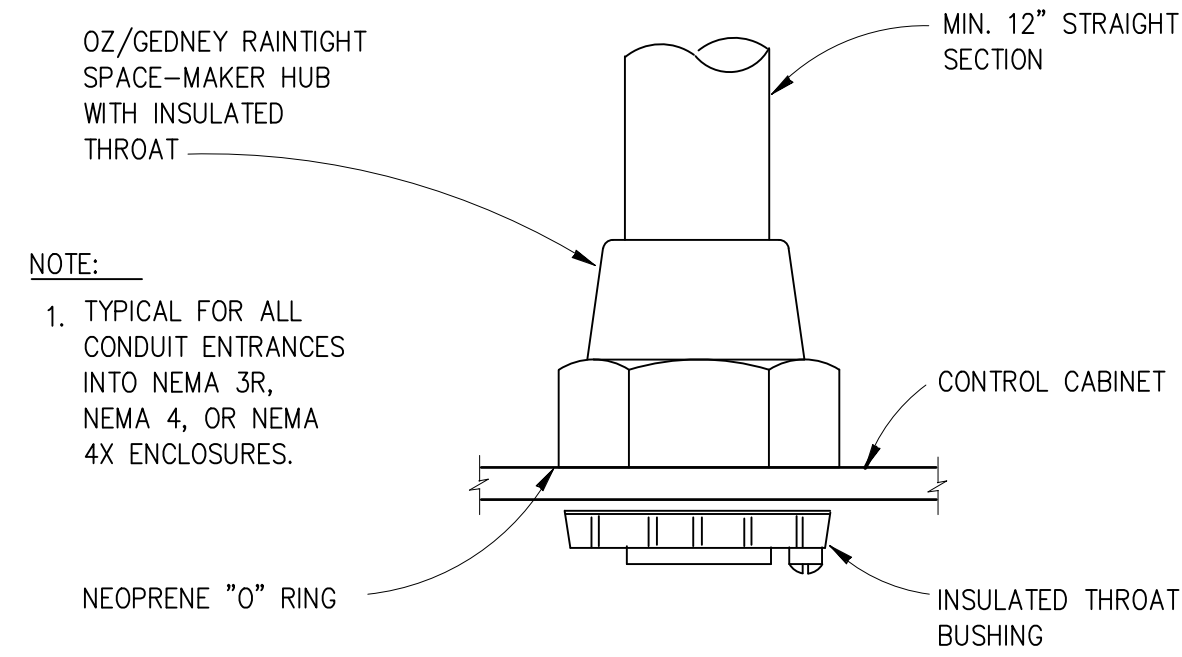
COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
EFFLUENT PUMP No.3 CONTROL RISER

DATE: MAY 2023
SHEET: 21 OF 22
DRAWING: E-09

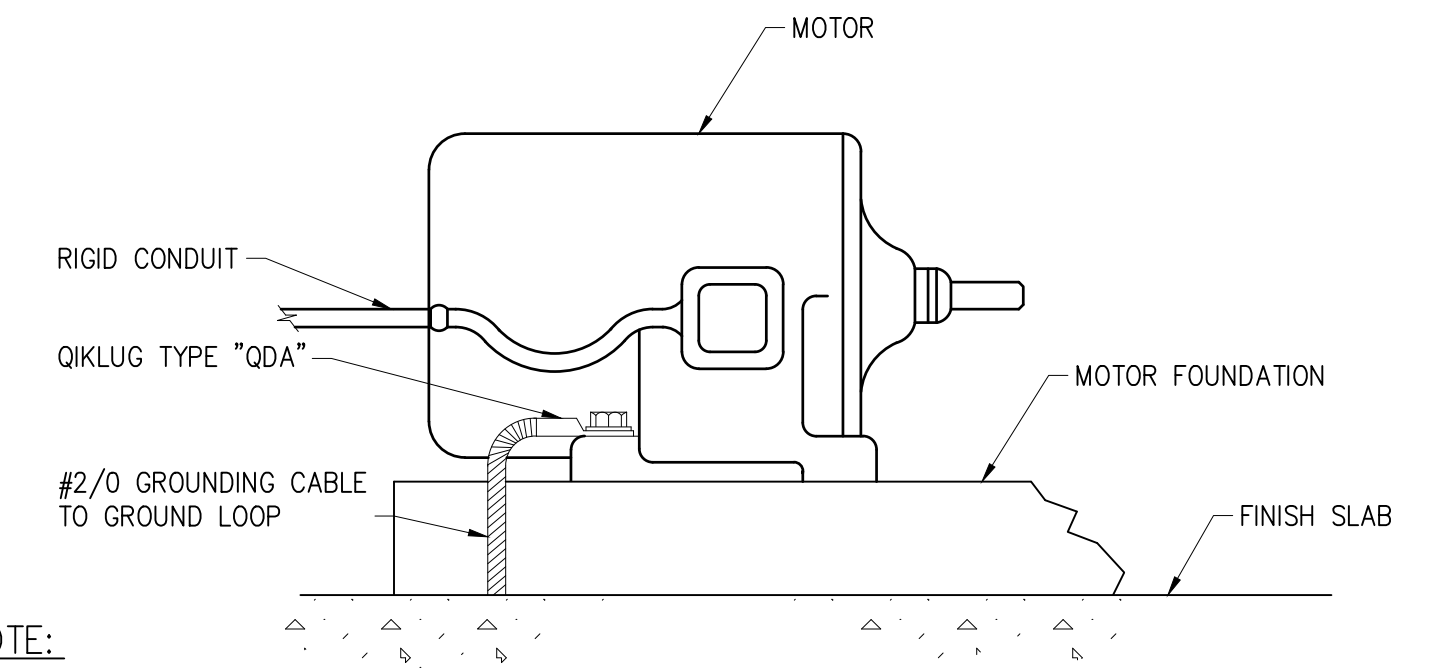
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CONDUIT PENETRATION AT WALL OR SLAB
1611112

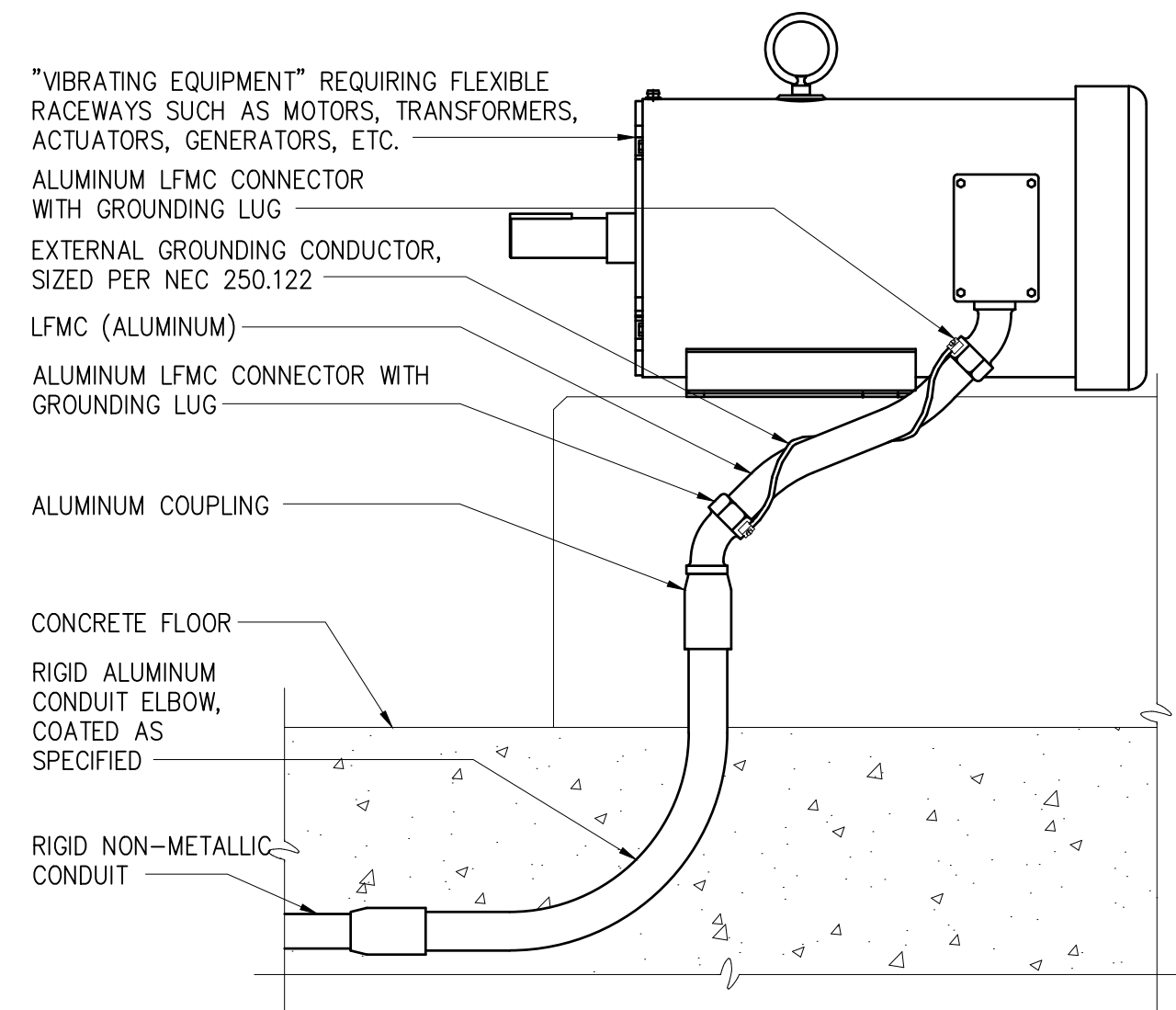
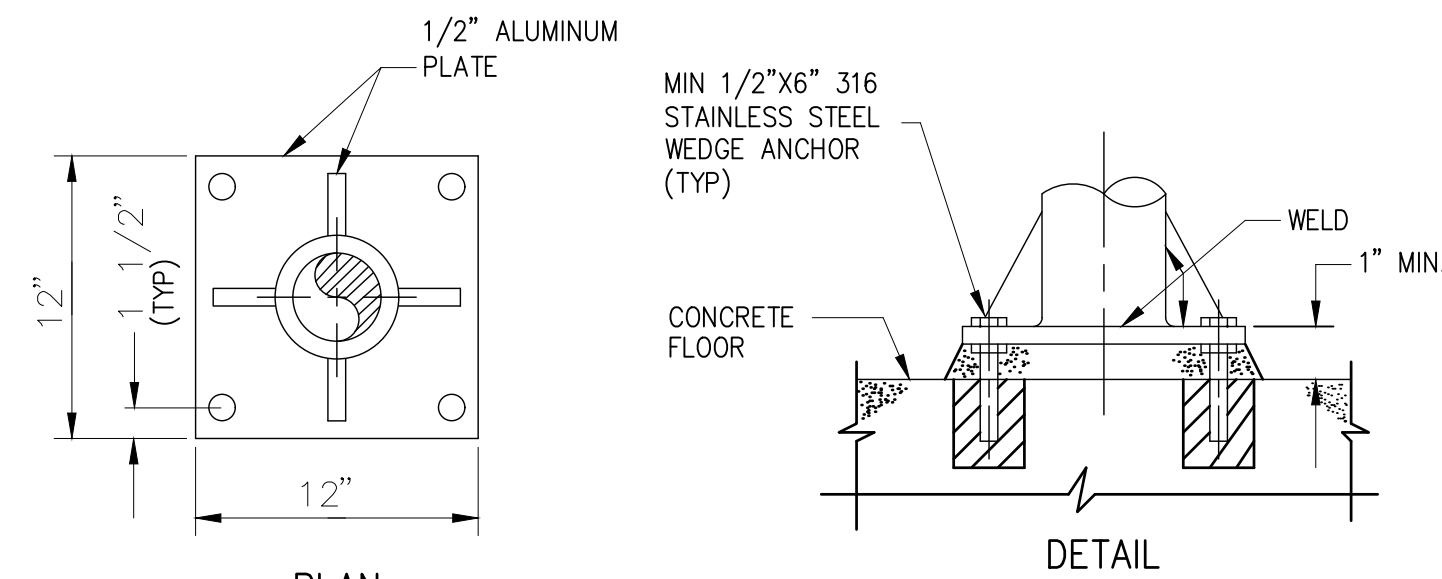


CONDUIT HUB
1611110



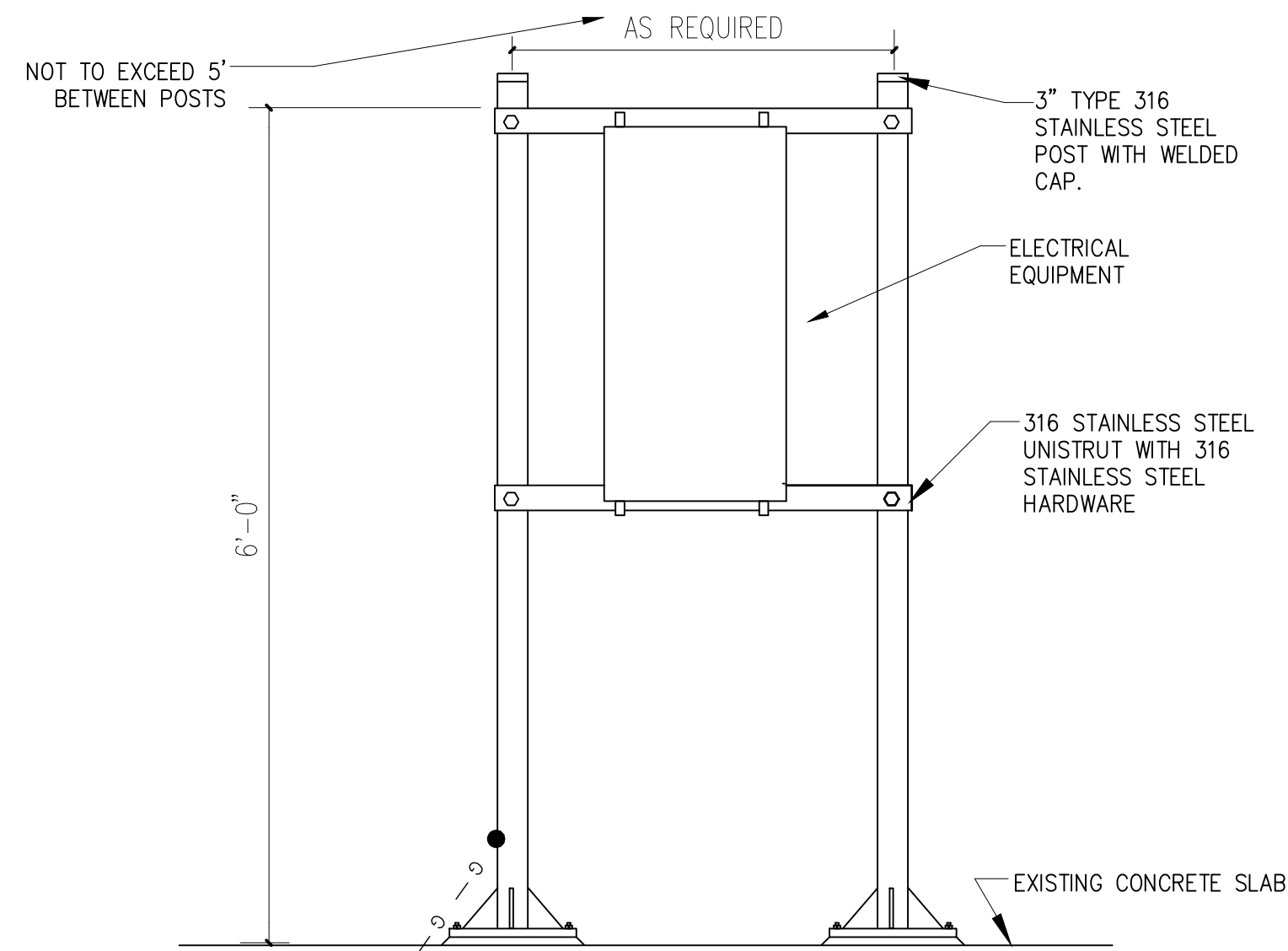
NOTE:
THIS GROUND IS IN ADDITION TO THE GROUND FROM THE MAIN ELECTRICAL SERVICE.

MOTORS AND EQUIPMENT GROUNDING
1611106B



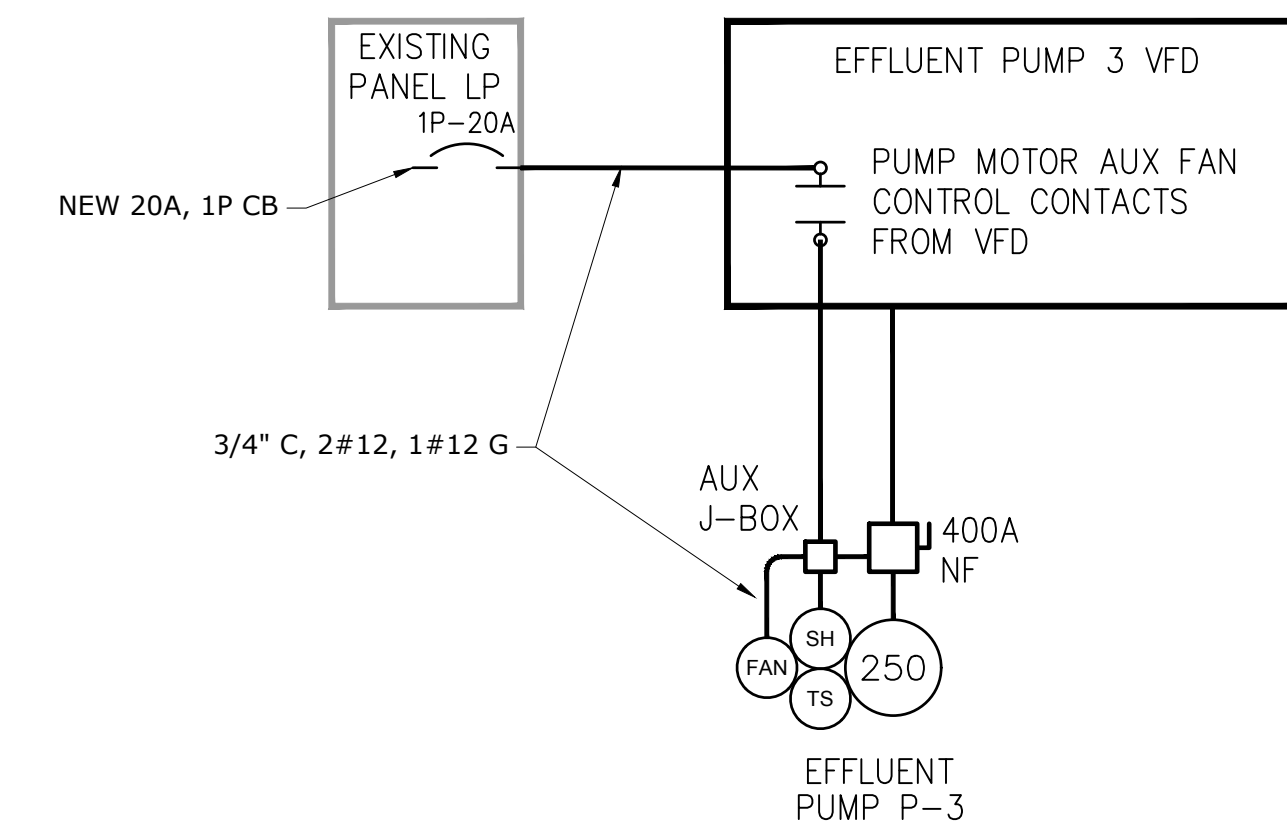
WHERE NON-METALLIC CONDUIT TRANSITIONS TO RIGID METALLIC CONDUIT AND / OR LIQUIDTIGHT METALLIC CONDUIT, (LFMC), TO FEED VIBRATING TYPE LOADS, THE CONTRACTOR SHALL FURNISH AND INSTALL AN EXTERNAL BARE COPPER GROUNDING CONDUCTOR AND APPROVED GROUNDING LFM CONNECTORS TO ENSURE GROUND CONTINUITY TO THE RIGID METALLIC CONDUIT AS SHOWN. THE GROUNDING CONDUCTOR SHALL BE SIZED ACCORDING TO NEC 250.122 AND BE NEATLY WRAPPED AROUND LFM AS SHOWN. LFM INSTALLED IN THIS MANNER CANNOT BE USED FOR A CONTINUOUS GROUND PATH PER NEC 350.60.

LFMC CONDUIT GROUND STRAP DETAIL
1611106



NOTE:
ADJUST THE NUMBER OF SUPPORT POSTS TO ACCOMMODATE THE EQUIPMENT TO BE INSTALLED.

TYPICAL EQUIPMENT RACK ON GRADE
1613010



PUMP MOTOR AUXILIARY COOLING FAN RISER

NOTE:
1. VFD SHALL BE TAGGED TO INDICATE: \"DANGER, VOLTAGES FROM MULTIPLE SOURCES\"
2. CONTRACTOR SHALL PROVIDE COORDINATION BETWEEN THE PUMP SUPPLIER AND THE VFD SUPPLIER TO OBTAIN PUMP MOTOR AUXILIARY COOLING FAN ELECTRICAL REQUIREMENTS.

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1	07/22	100% SUBMITTAL	GAB

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1	07/22	100% SUBMITTAL	GAB

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 HOLLYWOOD, FLORIDA 33021

SCALE	AS NOTED
CLIENTS PROJECT:	-
ENGINEERS PROJECT:	4679-004
CAD REFERENCE:	4679-004-E10.dwg


COOPER CITY

COOPER CITY UTILITIES DEPARTMENT
EFFLUENT PUMP REPLACEMENT
ELECTRICAL DETAILS - SHEET 1

DATE:	MAY 2023
SHEET:	22 OF 22
DRAWING:	E-10

BID SET



CITY OF COOPER CITY, FLORIDA

Technical Specifications

Effluent Pump #3 Replacement

ITB 2023-05-UTL

Prepared by:

Hazen and Sawyer
4000 Hollywood Blvd., Suite 750N
Hollywood, Florida 33021
Phone: 954-987-0066

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CITY OF COOPER CITY, FLORIDA WASTEWATER TREATMENT PLANT EFFLUENT PUMP REPLACEMENT

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01 25 00	Substitution Procedures
01 33 00	Submittal Procedures
01 42 00	References
01 61 00	Product Requirements and Options
01 65 00	Product Delivery Requirements
01 75 00	Checkout and Startup Procedures
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DIVISION 9 – FINISHES

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EXHIBITS

Exhibit 1	Broward County Transportation Concurrency Satisfaction Certificate
Exhibit 2	Broward County Environmental Review Approval Certificate
Exhibit 3	Broward County License for Construction to a Wastewater Treatment Facility
Exhibit 4	FDEP Minor Revision to a Wastewater Facility or Activity Permit

SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.01 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at the City of Cooper City Wastewater Treatment Plant. See project address and location map on the Drawings.

- B. The City of Cooper City (the “City”) is seeking a single contractor to furnish and install a new 250-horsepower vertical turbine pump at the City’s existing wastewater treatment plant effluent pump station. The proposed pump is replacing an existing 100-horsepower vertical turbine pump that was previously removed by the City. The contractor shall also furnish and install a variable frequency drive that will control the pump speed. Bidders shall comply with the terms, conditions, and specifications contained in this solicitation. The awarded vendor shall provide labor, materials, insurance, and incidentals for a complete and operable project to the City of Cooper City. This project is funded through the American Rescue Plan Act (ARPA) of 2021. Consequently, the awarded vendor shall comply with requirements of agreement number Y5181 entered into by and between the State of Florida, Division of Emergency Management and the City of Cooper City. In case of any conflict between the City’s contract terms and conditions and ARPA provisions, the ARPA provisions shall prevail.

1.02 CONTRACTOR’S USE OF SITE

- A. Contractors’ use of the Site shall be confined to the areas shown. Contractors shall share use of the Site with other contractors and others specified in this Section.

- B. Contractor shall move stored products that interfere with operations of Owner, other contractors, or others performing work for Owner.

1.03 SALVAGE OF EQUIPMENT AND MATERIALS

- A. Existing equipment and material removed by Contractor shall not be reused in the Work, except where specified or indicated.

- B. Carefully remove in manner to prevent damage all equipment and materials specified or indicated to be salvaged and reused or to remain property of Owner. Store and protect salvaged items specified or indicated to be used in the Work. Replace in kind or with new items equipment, materials, and components damaged in removal, storage, or handling through carelessness or improper procedures.

11-18-20

- C. Contractor may furnish and install new items, with Engineer’s approval, instead of those specified or indicated to be salvaged and reused, in which case such removed items will become Contractor’s property.

1.04 PERMITS

- A. It shall be the CONTRACTOR’s responsibility to secure all permits of every description required to initiate and complete the work under this contract, except permits obtained by the OWNER.
- B. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the CONTRACTOR’s responsibility to familiarize themselves and comply with such regulations or requirements as they apply to their operations on this Project.
- C. The ENGINEER will furnish signed and sealed sets of Contract Documents for permit use as required.
- D. The CONTRACTOR shall furnish to the ENGINEER copies of all permits prior to commencement of Work requiring permits.
- E. No payments will be made for any work undertaken without first acquiring and furnishing copies of permits to ENGINEER.
- F. The OWNER has acquired the permits presented in the table below:

Agency	Permit	Permit Number	Exhibit
Broward County	Transportation Concurrency Satisfaction Certificate	0088498	Exhibit 1
Broward County	Environmental Review Approval Certificate	000445016	Exhibit 2
Broward County	License for Construction to a Wastewater Treatment Facility	WW-63118	Exhibit 3
FDEP	Minor Revision to a Wastewater Facility or Activity Permit	FL0040398	Exhibit 4

- G. The CONTRACTOR shall comply with all permit requirements and conditions regardless of who (CONTRACTOR/OWNER/ENGINEER) obtained the permit.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 00
COORDINATION WITH OWNER'S OPERATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for coordinating with Owner's operations during the Work and included requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Section.
2. Contractor shall provide labor, materials, tools, equipment and incidentals shown, specified and required to coordinate with Owner's operations during the Work.

B. General Requirements:

1. Except for shutdowns specified in this Section, perform the Work such that Owner's facility remains in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, or cause odors or other nuisances.
2. Work not specifically covered in this Section or in referenced Sections may, in general, be completed at any time during regular working hours in accordance with the General Conditions and Supplementary Conditions, subject to the requirements in this Section.
3. Contractor has the option of providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.
4. Coordinate shutdowns with Owner and Engineer. When possible, combine multiple tie-ins into a single shutdown to minimize impacts on Owner's operations and processes.
5. Do not shut off or disconnect existing operating systems, unless accepted by Engineer in writing. Operation of existing equipment will be by Owner unless otherwise specified or indicated. Where necessary for the Work, Contractor shall seal

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or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both. Provide temporary watertight plugs, bulkheads, and line stops as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.

C. Continuous Treatment Provision:

1. Federal regulations prohibit bypassing of untreated or partially treated wastewater or sewage during construction Work.
2. Contractor shall provide labor, equipment, materials, and incidentals to provide continuous treatment to the level prior to construction Work.
3. Contractor shall be responsible for providing temporary pumping facilities, systems, piping, valve, appurtenances, equipment, materials, and temporary utilities necessary to complete the Work without treatment bypassing.

1.02 REFERENCES

- A. Definitions: A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, piping, or conduit, has to be temporarily suspended or taken out of service to perform the Work.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review installation procedures under other Specification sections and coordinate Work that must be performed with or before the Work specified in this Section.
2. Notify other contractors in advance of Work requiring coordination with Owner's operations, to provide other contractors sufficient time for work included in their contracts that must be installed with or before Work specified in this Section.
3. When possible, combine multiple tie-ins into a single shutdown to minimize impacts on Owner's operations and processes.

- B. Pre-Shutdown Meetings: Contractor shall schedule and conduct meeting with Owner and Engineer prior to scheduling shutdown

C. Sequencing:

1. Perform the Work in the specified sequence. Certain phases or stages of the Work may require working 24-hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if Owner's operations are not adversely affected by proposed sequence change, with Engineer's

acceptance. Stages specified in this Section are sequential in performance of the Work.

D. Scheduling:

1. Work that may interrupt normal operations shall be accomplished at times convenient to Owner.
2. Furnish at the Site, near the shutdown and tie-in work areas, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with these requirements before commencing the shutdown.
3. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
4. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not conform to the requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in conducting the Work.
5. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
6. Temporary, short-term shutdowns of smaller piping, conduits, equipment, and systems may be required. Coordinate requirements for such shutdowns with Engineer and Owner.

1.04 SUBMITTALS

1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor and materials required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to Engineer at least thirty (30) days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning submittal.

2. Shutdown Notification: After acceptance of shutdown planning submittal and prior to starting the shutdown, provide written notification to Owner and Engineer of date and time each shutdown is to start. Provide notification at least 72 hours in advance of each shutdown.

1.05 SITE CONDITIONS

- A. General Constraints: Specified in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits that are to be taken out of service temporarily for the Work. New equipment, materials, and systems may be used by Owner after the specified field quality controls and testing are successfully completed and the materials or equipment are Substantially Complete.
- B. The following constraints apply to coordination with Owner's operations:
 1. Operational Access: Owner's personnel shall have access to equipment and areas that remain in operation.
 2. The existing effluent pump station can be shut down for short periods for contractor installation of the proposed pump and piping. The Contractor shall fully coordinate the date, start and finish time of shut downs with the Owner.

1.06 SUGGESTED SEQUENCE OF WORK

- A. The Contractor shall propose a work sequence to the Owner that minimizes shut down of the existing effluent pump station.

1.07 SHUTDOWNS

- A. General:
 1. Work that may interrupt normal operations shall be accomplished at times convenient to Owner.
 2. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to the associated shutdown. Demonstrate to Owner's satisfaction that Contractor has complied with these requirements before commencing the shutdown.
 3. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
 4. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not conform

to the requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in conducting the Work.

5. Temporary, short-term shutdowns of smaller piping, conduits, equipment, and systems may not be included in Table 01 14 00-B. Coordinate requirements for such shutdowns with Engineer and Owner.

B. Treatment Process Shutdown and Site Access Constraints:

1. Owner shall have the following unit processes and equipment operational at all times during the Project.

- C. Shutdowns of Electrical Systems: Comply with Laws and Regulations, including the National Electric Code. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started. Upon completion of shutdown Work, remove the locks and tags and notify Engineer that facilities are available for use.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Procedural requirements for product substitutions.
 - 2. Procedural requirements for substitute construction methods or procedures, when construction methods or procedures are specified.
- B. Requests for substitutions of equipment and material shall conform to the requirements of the General Conditions and Supplemental Conditions.
- C. Procedure for substitution requests and review including evaluation, reimbursement, acceptance, and determination shall be in accordance with General Conditions and Supplemental Conditions.

1.02 REFERENCES

- A. Definitions: The following words or terms are not defined but, when used in this Section, have the following meaning:
 - 1. “Acceptable Manufacturers” considered for substitution include Suppliers of equipment and material of proven reliability, and as manufactured by reputable manufacturers having experience in the production of specified equipment and material. Equipment furnished shall be designed, constructed, and installed in accordance with the industry accepted practices and shall operate satisfactorily when installed in accordance with the Contract Documents.
 - 2. “Products” includes materials, equipment, machinery, components, fixtures, systems, and other goods incorporated in the Work. Products do not include machinery and equipment used for preparing, fabricating, conveying, erecting, or installing the Work. Products include Owner-furnished goods incorporated in the Work where use of such goods is specifically required in the Contract Documents.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Contractor’s Responsibilities: In submitting request for substitution, Contractor represents that:

1. Contractor has investigated proposed substitution and determined that it is equivalent to item, product, method, or procedure specified, as applicable.
 2. Contractor will provide the same or better guarantees or warranties for proposed substitution as for the specified product, manufacturer, method, or procedure, as applicable.
 3. Contractor waives all Claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.
 4. Contractor shall submit a minimum of five (5) successful installations of the manufacturer's equipment of the same model, size, and type as specified in the Contract Documents.
 5. All costs associated with incorporation of a substitution shall be borne by the Contractor, including but not limited to, the cost of redesign and construction provisions.
- B. Engineer's Review: A proposed substitution will not be accepted for review if:
1. Approval would require changes in design concept or a substantial revision of the Contract Documents.
 2. Approval would delay completion of the Work or the work of other contractors.
 3. Substitution request is indicated or implied on a Shop Drawing or other submittal, or on a request for interpretation or clarification, and is not accompanied by Contractor's formal request for substitution.
 4. If the substitution is not clearly substantiated by performance criteria as providing an equivalent or superior performing installation.
 5. All costs associated with Engineer's review of a substitution shall be recorded by Engineer, submitted to Owner, and charged to Contractor.
- C. If Engineer does not approve the proposed substitute, Contractor shall provide the specified product, manufacturer, method, or procedure, as applicable.
- D. Approval of a substitution request will not relieve Contractor from requirement for submitting Shop Drawings as set forth in the Contract Documents.
- E. Product Substitutions Procedure:
1. Requests for approval of substitute products or items will be considered for a period of 30 days after the Effective Date of the Agreement. After end of specified

period, requests will be considered only in case of unavailability of a specified product or other conditions beyond Contractor's control.

2. Submit copies of request for substitution.
3. Submit separate request for each substitution.
4. In addition to requirements of the General Conditions and information required on substitution request forms, include with request the following:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature with product description, performance and test data, and reference standards with which product complies.
 - c. Samples, if appropriate.
 - d. Name and address of similar projects on which product was used, and date of installation.
 - e. Certified tests, where applicable, by an independent laboratory attesting the proposed substitution is equal.
 - f. Cost information for the proposed substitution and the specified products.
 - g. Lead time information for the proposed substitution and specified products.
 - h. All other submittal requirements indicated in the individual Specification Sections associated with the specified equipment and material.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Contractor shall provide submittals in accordance with the General Conditions as modified by the Supplementary Conditions, and this Section.
2. Contractor is responsible to confirm and correct dimensions at the Site, for information pertaining to the fabrication processes and to techniques of construction, and for coordinating the work of all trades. Contractor's signature of submittal's stamp and letter of transmittal shall be Contractor's representation that Contractor has met his obligations under the Contract Documents relative to that submittal.

B. Related Sections:

1. Section 01 25 00 – Substitution Procedures.
2. Section 01 78 23 – Operation and Maintenance Data.
3. Section 01 78 39 – Project Record Documents.
4. Section 01 79 00 – Instruction of Owner's Personnel.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Types of Submittals: When type of submittal is not specified and is not specified in this Section, Engineer will determine type of submittal.

1. Action/Informational Submittals:

- a. Shop Drawings.
- b. Product data.
- c. Delegated design submittals in accordance with the General Conditions and as modified by the Supplemental Conditions.
- d. Samples.

- e. Testing plans, procedures, and testing limitations.
 - f. Design data not sealed and signed by a design professional retained by Contractor, Subcontractor, or Supplier.
 - g. Pre-construction test and evaluation reports, such as reports on pilot testing, subsurface investigations, potential Hazardous Environmental Conditions, and similar reports.
 - h. Supplier instructions, including installation data, and instructions for handling, starting-up, and troubleshooting.
 - i. Sustainable design submittals (other than sustainable design closeout documentation).
 - j. Lesson plans for training and instruction of Owner's personnel.
2. Payment applications will be reviewed for approval by the Owner.
3. Construction Progress Schedules will be reviewed for approval by the Owner.
4. Closeout Submittals:
- a. Maintenance contracts.
 - b. Operations and maintenance data.
 - c. Bonds, such as maintenance bonds and bonds for a specific product or system.
 - d. Warranty documentation.
 - e. Record documentation.
 - f. Sustainable design closeout documentation.
 - g. Software.
5. Maintenance Material Submittals:
- a. Maintenance materials schedule and checklist.
 - b. Spare parts.
 - c. Extra stock materials.
 - d. Tools.

6. Quality Assurance Submittals:
 - a. Performance affidavits.
 - b. Certificates.
 - c. Source quality control submittals (other than testing plans, procedures, and testing limitations), including results of shop testing.
 - d. Field or Site quality control submittals (other than testing plans, procedures, and testing limitations), including results of operating and acceptability tests at the Site.
 - e. Supplier reports.
 - f. Special procedure submittals, including health and safety plans and other procedural submittals.
 - g. Qualifications statements.

B. Submittal Requirements:

1. Contractor shall submit electronic copy of submittals for Engineer's review via email, unless otherwise specified in individual Specification Sections. Acceptable electronic formats are Adobe PDF, Microsoft Word, Autodesk DWF and AutoCAD.
2. Engineer's review is limited to shop drawings for the following items:
 - a. Vertical Turbine Pump
 - b. Motor
 - c. VFD
 - d. Conduit and wire
 - e. Support framing for the conduit
3. All other shop drawings shall be reviewed by the Owner.
4. Submittal shall be accompanied by letter of transmittal containing date, project title, Contractor's name, number and title of submittal, list of relevant Specification Sections, notification of deviations from Contract Documents, and other material required for Engineer's review.

C. Scheduling:

1. Provide submittals well in advance of the Work following Engineer's approval or acceptance of the associated submittal. Work covered by a submittal will not be included in progress payments until approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.
2. Submittals shall be provided by Contractor with at least fourteen (14) working days for review and processing.

1.03 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals, as specified in this Section:

1. Timing:
 - a. Provide submittal within time frames specified in the Contract Documents.
 - b. Provide updated Schedule of Submittals with each submittal of the updated Progress Schedule.
2. Content: In accordance with the General Conditions as modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent submittals of the Schedule of Submittals are identical.
 - a. Identify submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Indicate submittals that are on the Project's critical path.
 - b. Indicate the following for each submittal:
 - 1) Date when submittals are requested and received from Supplier.
 - 2) Date when certification is received from Supplier and when submitted to Engineer.
 - 3) Date when submittals are submitted to Engineer and returned with disposition from Engineer.
 - 4) Date when submittals are revised by Supplier and submitted to Engineer.
 - 5) Date when submittals are returned with "Furnish as Submitted" (FAS) or "Furnish as Corrected" (FAC) disposition from Engineer.
 - 6) Date when approved submittals are returned to Supplier.

- 7) Date of Supplier scheduled delivery of equipment and material.
 - 8) Date of actual delivery of equipment and material.
 - 9) Whether submittal will be for a substitution or “equal”. Procedures for substitutions and “or equals” are specified in the General Conditions and the Section 01 25 00 – Substitution Procedures.
 - 10) For submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors.
3. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules.
 4. Coordinate Schedule of Submittals with the Progress Schedule.
 5. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate submittals on the Project’s critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include submittals not required by the Contract Documents.
 6. In preparing Schedule of Submittals:
 - a. Considering the nature and complexity of each submittal, allow sufficient time for review and revision.
 - b. Reasonable time shall be allowed for: Engineer’s review and processing of submittals, for submittals to be revised and resubmitted, and for returning submittals to Contractor.
 - c. Identify and accordingly schedule submittals that are expected to have long anticipated review times.

1.04 ACTION/INFORMATIONAL SUBMITTALS

- A. Provide the following Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:
 1. Product Data:
 - a. Catalog cut-sheets
 - b. Descriptive bulletins/brochures/specifications

- c. Material of construction data, including details on all components including applicable ASTM designations.
 - d. Lifting, erection, installation, and adjustment instructions, and recommendations.
 - e. Finish/treatment data, including interior and exterior shop coating systems.
 - f. Equipment/material weight/loading data, including total uncrated weight of the equipment plus the approximate weight of shipped materials. Support locations and loads that will be transmitted to bases and foundations following installation. Size, placement, and embedment requirements of anchor bolts.
 - g. Complete information regarding location, type, size, and length of all field welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society. Special conditions shall be fully explained by notes and details.
 - h. Motor data including horsepower; enclosure type; voltage; insulation class; temperature rise and results of dielectric tests; service-rating; rotative speed; motor speed-torque relationship; efficiency and power factor at $\frac{1}{2}$, $\frac{3}{4}$, and full load; slip at full load; running, full load, and locked rotor current values; safe running time-current curves; motor protective devices; and interconnection diagrams.
 - i. Engineering design data, calculations, and system analyses
 - j. Digital system documentation
 - k. Operating sequence descriptions
 - l. Software/programming documentation
 - m. Manufacturer's instructions
2. Shop Drawings:
- a. Equipment and material layout drawings, including panel layout drawings.
 - b. System schematics and diagrams including, but not limited to, piping systems; HVAC and ventilation systems; process equipment systems; electrical operating systems; wiring diagrams; controls, alarm and communication systems.

- c. Layout and installation drawings (interior and exterior) for all pipes, valves, fittings, sewers, drains, heating and ventilation ducts, all electrical, heating, ventilating and other conduits, plumbing lines, electrical cable trays, lighting fixture layouts, and circuiting, instrumentation, interconnection wiring diagrams, communications, power supply, alarm circuits, etc.
 - d. Layout and installation drawings shall show connections to structures, equipment, sleeves, valves, fittings, etc.
 - e. Drawings shall show the location and type of all supports, hangers, foundations, etc., and the required clearances to operate valves, equipment, etc.
 - f. Drawings for pipes, ducts, conduits, etc., shall show all 3 inch and larger electrical conduits and pressure piping, electrical cable trays, heating and ventilation ducts or pipes, structure, manholes or any other feature within four (4) feet (measured as the clear dimension) from the pipe duct, conduit, etc., for which the profile is drawn.
 - g. Equipment and material schedules.
3. Delegated design submittals, which include documents prepared, sealed, and signed by a design professional retained by Contractor, Subcontractor, or Supplier for materials and equipment to be incorporated into the completed Work. Delegated design submittals do not include submittals related to temporary construction unless specified otherwise in the related Specification Section. Delegated design submittals include: design drawings, design data including calculations, specifications, certifications, and other submittals prepared by such design professional.

B. Samples:

1. General Requirements:
 - a. Conform submittal of Samples to the General Conditions as modified by the Supplementary Conditions, this Section, and the Specification Section in which the Sample is specified.
 - b. Furnish at the same time Samples and submittals that are related to the same unit of Work or Specification Section. Engineer will not review submittals without associated Samples and will not review Samples without associated submittals.
 - c. Samples shall clearly illustrate functional characteristics of product, all related parts and attachments, and full range of color, texture, pattern, and material.

2. Submittal Requirements:

- a. Securely label or tag Samples with submittal identification number. Label or tag shall not cover, conceal, or alter appearance or features of Sample. Label or tag shall not be separated from the Sample.
- b. Submit number of Samples required in Specifications. If number of Samples is not specified in the associated Specification Section, provide at least one identical Samples of each item required for Engineer's approval. If Contractor requires Sample(s) for Contractor's use, notify Engineer in writing and provide additional Sample(s). Contractor is responsible for furnishing, shipping, and transporting additional Samples.
- c. Deliver one Sample to Engineer's field office at the Site. Deliver balance of Samples to location directed by Engineer.

1.05 CLOSEOUT SUBMITTALS

- A. Provide the following Closeout Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:
 1. Maintenance contracts
 2. Bonds for specific products or systems
 3. Warranty documentation
 4. Sustainable design closeout documentation.
 5. Software programming and documentation.
- B. On documents such as maintenance contracts and bonds, include on each document furnished original signature of entity issuing the document.
- C. Operations and Maintenance Data: Submit in accordance with Section 01 78 23 – Operations and Maintenance Data.
- D. Record Documentation: Submit in accordance with Section 01 78 39 – Project Record Documents.
- E. Disposition: Dispositions and meanings are the same as specified for Informational Submittals.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall review, coordinate, and verify submittals with Subcontractors, Manufacturers, and Suppliers, including field measurements at Site, in accordance with the General Conditions and as modified by Supplemental Conditions prior to submitting material for Engineer's review.
- B. Contractor shall provide Contractor's stamp of approval certifying submittal material has been reviewed and conform to the Contract Documents prior to submitting material for Engineer's review.
- C. Contractor shall provide written notice of deviations or variations that submittal may have with the Contract Documents.
- D. Contractor shall provide bound, dated, labeled, tabulated, and consecutively numbered submittals as specified in the individual Specification Section. Label shall contain the following:
 - 1. Specification Section.
 - 2. Referenced Drawing number.
 - 3. Subcontractor or Supplier name.
 - 4. Type of equipment and/or materials.
- E. Contractor shall perform the following after receiving Engineer's review disposition:
 - 1. Order, fabricate, or ship equipment and materials included in the submittal (pending Engineer's review of source quality control submittals) with the following disposition:
 - a. "Furnish as Submitted" (FAS).
 - b. "Furnish as Corrected" (FAC).
 - c. "Furnish as Corrected – Confirm" (FACC), only portions of Work that do not require resubmittal for Engineer's review.
 - 2. Resubmittal requirements:
 - a. Partial resubmittal of "Furnish as Corrected – Confirm" (FACC) returned dispositions, until Engineer's disposition is either "Furnish as Submitted" (FAS) or "Furnish as Corrected" (FAC).

- b. Full resubmittal of material with Engineer's disposition of "Revise and Resubmit" (R&R), until Engineer's disposition is "Furnish as Submitted" (FAS), "Furnish as Corrected" (FAC), or "Furnish as Corrected – Confirm" (FACC) that requires a partial resubmittal.
- c. Contractor shall be responsible for Engineer's charges to Owner if submittals are not approved within the number of specified submittals in accordance with the General Conditions. Engineer's charges shall include, but not limited to, additional review effort, meetings, and conference calls with Contractor, Subcontractor, or Supplier.

1.07 ENGINEER'S REVIEW

- A. Engineer's review of the Contractor's submittal shall not relieve Contractor's responsibility under the Contract Document in accordance with the General Conditions and as modified in the Supplemental Conditions. An acceptance of a submittal shall be intended to mean the Engineer does not have specific objection to the submitted material, subject to conformance with the Contract Drawings and Specifications.
- B. Engineer's review of Contractor's submittal shall be confined to general arrangement and compliance with the Contract Documents, and shall not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of Subcontractor work, etc.
- C. Review Dispositions:
 - 1. "Furnish as Submitted" (FAS) – No exceptions are taken.
 - 2. "Furnish as Corrected" (FAC) – Minor corrections are noted for Contractor's correction.
 - 3. "Revise and Resubmit" (R&R) – Corrections are noted and complete resubmittal shall be made. Submittal does not conform to applicable requirements of the Contract Documents and is not acceptable. Revise submittal and re-submit to indicate acceptability and conformance with the Contract Documents.
 - 4. "Receipt Acknowledged" (RA) –
 - a. Information included in submittal conforms to the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to this submittal, and the Work covered by the submittal may proceed, and products with submittals with this disposition may be shipped or operated, as applicable.
 - b. Information included in submittal is for Project record purposes and does not require Engineer's review or approval.

5. "Rejected" (R) – Information included in submittal does not conform to the applicable requirements of the Contract Documents and is unacceptable. Contractor shall submit products and materials as specified in the Contract Documents or provide required information for substitution as specified in the Contract Documents for consideration by Engineer.

D. Electronic Submittal Return to Contractor: Electronic submittals shall be returned electronically with dispositions provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 42 00
REFERENCES

PART 1 – GENERAL

1.01 SUMMARY

- A. Definitions and terminology applicable to all the Contract Documents are included in the General Conditions and Supplementary Conditions.

1.02 REFERENCES

- A. Abbreviations and Acronyms: Common abbreviations that may be found in the Contract Documents are listed below:

alternating current	a-c
ampere	A
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
average	avg
biochemical oxygen demand	BOD
brake horsepower	bhp
British thermal unit	Btu
Centigrade (or Celsius)	C
chlorinated polyvinyl chloride	CPVC
Code of Federal Regulations	CFR
cubic inch	cu in
cubic foot	cu ft
cubic yard	cdu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs

degree Centigrade (or Celsius)	degrees C or °C
degrees Fahrenheit	degrees F or °F
diameter	dia
direct current	d-c
dollars	\$
each	ea
efficiency	eff
Fahrenheit	F
Florida Building Code	FBC
feet	ft
feet per hour	fph
feet per minute	fpm
feet per second	fps
figure	Fig
flange	flg
Florida Department of Environmental Protection	FDEP
foot-pound	ft-lb
gallon	gal
gallons per hour	gph
gallons per minute	gpm
gallons per second	gps
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
hour	hr
human-machine interface	HMI
inch	in.

inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
kilowatt	kw
linear foot	lin ft or LF
liter	L
maximum	max
mercury	Hg
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallons	MG
minimum	min
national pipe threads	NPT
net positive suction head	NPSH
net positive suction head available	NPSHA
net positive suction head required	NPSHR
nominal pipe size	NPS
number	no.
operator interface terminal	OIT
ounce	oz
ounce-force	ozf

outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig
pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
second	sec
specific gravity	sp gr or SG
square	sq
square foot	sq ft or sf
square inch	sq in.
square yard	sq yd or SY
standard	std
standard cubic feet per minute	scfm
total dynamic head	TDH

B. Definitions: Terminology used in the Specifications includes:

1. "Indicated" refers to graphic representations, notes, or schedules on the Drawings, or to other paragraphs or schedules in the Specifications and similar locations in the Contract Documents.
2. "Shown", "noted", "scheduled", and "specified" are used to help the user locate the reference without limitation on the location.

3. “Installer”, “applicator”, or “erector” is Contractor or another entity engaged by Contractor, either as an employee or subcontractor, to perform a particular construction activity, including installation, erection, application or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.
4. “Experienced”, when used with the term “installer” means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; being familiar with Laws and Regulations; and having complied with requirements of authorities having jurisdiction, and complying with requirements of the Supplier of the material or equipment being installed.
5. Trades: Use of a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”, unless otherwise indicated in the Contract Documents or required by Laws or Regulations. Such terminology also does not imply that specified requirements apply exclusively to trade personnel of the corresponding generic name.
6. “Assigned specialists” and similar terms: Certain Sections of the Specifications require that specific construction activities be performed by specialists recognized as experts in those operations. Engage said specialists for those activities, and their engagement is a requirement over which Contractor has no option. These requirements do not conflict with enforcement of building codes and other Laws and Regulations. Also, such requirements are not intended to interfere with local trade union jurisdictional settlements and similar conventions. Such assignments shall not relieve Contractor of responsibility for complying with the requirements of the Contract Documents.

C. Reference Standards:

1. Refer to General Conditions, as may be modified by the Supplementary Conditions, relative to reference standards and resolving discrepancies between reference standards and the Contract Documents. Provisions of reference standards are in effect in accordance with the Specifications.
2. Copies of Standards: Each entity engaged in the Work shall be familiar with reference standards applicable to its construction activity. Copies of applicable reference standards are not bound with the Contract Documents. Where reference standards are needed for a construction activity, obtain copies of standards from the publication source.
3. Abbreviations and Names: Where reference standards, specifications, codes, manuals, Laws or Regulations, or other published data of international, national, regional or local organizations are referred to in the Contract Documents, the

organization issuing the standard may be referred to by their acronym or abbreviation only.

4. Following acronyms or abbreviations that may appear in the Contract Documents shall have the meanings indicated below. Listing is alphabetical by acronym.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIFS	American Cast Iron Flange Standards
ACS	American Chemical Society
ADC	Air Diffusion Council
ADSC	International Association of Foundation Drilling.
AEIC	Association of Edison Illuminating Companies
AF&PA	American Forest and Paper Association
ABMA	American Bearing Manufacturers Association (formerly Anti- Friction Bearing Manufacturers Association (ABMA))
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHDGA	American Hot Dip Galvanizers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee
AMA	Acoustical Materials Association
AMCA	Air Movement and Control Association

AMP	National Association of Architectural Metal Manufacturers, Architectural Metal Products Division
ANSI	American National Standards Institute
APA	The Engineered Wood Association
API	American Petroleum Institute
APHA	American Public Health Association
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Non-Destructive Testing
ASQ	American Society for Quality
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industry
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
BOCA	Building Officials and Code Administrators
CBMA	Certified Ballast Manufacturers Association
CDA	Copper Development Association
CEMA	Conveyor Equipment Manufacturers Association

CGA	Compressed Gas Association
CISCA	Ceilings and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CPSC	Consumer Product Safety Commission
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DIN	Deutsches Institut für Normung eV (German Institute for Standardization)
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ETL	Intertek Testing Services, Inc. (formerly ETL Testing Laboratories, Inc.)
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Factory Mutual (FM Global)
FRPI	Fiberglass Reinforced Plastics Institute
FS	Federal Specification
GA	Gypsum Association
GANA	Glass Association of North America
HEW	United States Department of Health, Education and Welfare
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute
HUD	United States Department of Housing and Urban Development
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association

IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFI	Industrial Fasteners Institute
IFCEA	Insulated Power Cable Engineers Association
IRI	Industrial Risk Insurers
ISA	Instrumentation, Systems, and Automation Society (formerly Instrument Society of America)
ISO	Insurance Services Office
IOS	International Organization for Standardization
LPI	Lightning Protection Institute
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSS	Manufacturers' Standardization Society
MMA	Monorail Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Pipe Fabricators, Inc.
NARUC	National Association of Regulatory Utilities Commissioners
NBHA	National Builders Hardware Association
NBS	United States Department of Commerce, National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electric Code
NELMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NFRC	National Fenestration Rating Council

NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NHPMA	Northern Hardwood and Pine Manufacturers Association
NIST	United States Department of Commerce, National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	National Sanitation Foundation
NSSGA	National Stone, Sand, and Gravel Association
NTMA	National Terrazzo and Mosaic Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PEI	Porcelain Enamel Institute
PFI	Pipe Fabrication Institute
PPI	Plastics Pipe Institute
PGMC	Primary Glass Manufacturers Council
PS	Product Standards Section, United States Department of Commerce
RCSC	Research Council on Structural Connections (part of AISC)
RMA	Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SBCCI	Southern Building Code Congress International, Inc.
SCAQMD	Southern California Air Quality Management District
SCPRF	Structural Clay Products Research Foundation
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturing Association

SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SPI	Society of the Plastics Industry
SPIB	Southern Pine Inspection Bureau
SSPC	Society for Protective Coatings
SWI	Steel Window Institute
TCNA	Tile Council of North America
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USAB	United States Access Board
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
USGBC	United States Green Building Council
USGS	United States Geological Survey
USPHS	United States Public Health Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCMA	Wood Component Manufacturers Association
MDMA	Window and Door Manufacturers Association
WWEMA	Water and Wastewater Equipment Manufacturers Association
WWPA	Western Wood Products Association

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 61 00
PRODUCT REQUIREMENTS AND OPTIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Common requirements for products.
 - 2. Contractor’s options for selecting products.
 - 3. Requirements for consideration of “or equal” products.
 - 4. Warranty requirements of products.

1.02 REFERENCES

- A. Definitions:
 - 1. “Products” includes materials, equipment, machinery, components, fixtures, systems, and other goods incorporated in the Work. Products do not include machinery and equipment used for preparing, fabricating, conveying, erecting, or installing the Work. Products include Owner-furnished goods incorporated in the Work where use of such goods is specifically required in the Contract Documents.
 - 2. “Special Warranties” includes additions or modifications to standard warranty requirements specified in the Contract Documents.

1.03 SUBMITTALS

- A. Warranty Log Book:
 - 1. Submit warranty log book prepared specifically for this Project. Submittal shall include a summary listing of all equipment and material warranties furnished in the Contract, date received, and start/end date of warranty period. Individual warranty documentation shall be provided in the submittal.
 - 2. Submit prior to submittal of final application for payment.
- B. Patent Documentation: Submit licensing arrangement and agreement documentation.

1.04 REQUIREMENT

- A. Common Products:

1. Provide products that have not been previously incorporated into another project or facility unless otherwise indicated in the Contract Documents.
2. Provide products of the same generic kind from a single source.
3. Provide products complete with accessories, trim, finish, fasteners, and other items shown, indicated, or required for a complete installation for the indicated use and performance.
4. Standard Products: When available, and unless custom or nonstandard options are specified or indicated, provide standard products of types that have been produced and used successfully in similar situations on other projects.
5. Visual Matching: Where required in the Contract Documents, provide products that match referenced existing construction, approved mock-ups, or approved Sample, as determined by Engineer.
6. Where the Contract Documents include the phrase “as selected” for product color, finish pattern, option, or similar phrase, provide products selected by Engineer as follows:
 - a. Standard Range: Where the Contract Documents include the phrase “standard range of colors, patterns, textures” or similar phrase, provide color, pattern, density, or texture selected by Engineer from manufacturer’s product line that does not include premium items.
 - b. Full Range: Where the Contract Documents include the phrase “full range of colors, patterns, textures” or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer’s entire product line, including standard and premium items.

B. Product Compatibility:

1. Similar products by the same Supplier shall be compatible with each other, unless otherwise indicated in the Contract Documents.
2. Provide products compatible with products previously selected or installed on the Project.

C. Product Options:

1. For products specified only by reference standard or description, without reference to Supplier, provide products meeting that standard, by a Supplier or from a source that complies with the Contract Documents.

2. For products specified by naming one or more products or Suppliers, provide the named products that comply with the Contract Documents, unless an “or equal” or substitute product is approved by Engineer.
3. For products specified by naming one or more products or Suppliers and the term, “or equal”, when Contractor proposes a product or Supplier as an “or equal”, submit to Engineer a request for approval of an “or equal” product or Supplier.
4. For products specified by naming only one product or manufacturer and followed by words indicating that no substitution is allowed, there is no option and no substitution will be allowed.

D. Concerning Patents:

1. Owner shall be provided a guarantee by Contractor and equipment Supplier that equipment and material furnished in accordance with the Contract Documents is not the subject of patent litigation.
2. Patent litigation or controversy shall include, but not limited to, the following:
 - a. Actual furnished equipment and material the is subject or could be subject to patent litigation or is known to infringe on a patent.
 - b. Furnished equipment and material that may result in a process that use of equipment and material in a manner that infringes upon or violates a patent.
3. When patent infringement may occur, Contractor and Supplier shall submit license arrangements among parties, including Contractor, Supplier, and patent owner (controller of patent) at a minimum, which shall permit use of equipment and material as specified in the Contract Documents.
4. Supplier shall indemnify and hold harmless Owner and Engineer against all claims, costs, losses, and damages arising out of or relating to any infringement or patent rights or copyrights incident to the use of equipment and material specified in the Contract Documents and as required in General Conditions and as modified in the Supplemental Conditions.
5. For proposed products not named in the Contract Documents and considered as an “or equal” as defined in the General Conditions, Contractor shall request in writing Engineer’s approval of the “or equal”. Request for approval of an “or equal” product shall accompany the Shop Drawing or product data submittal for the proposed product and shall include:
 - a. Contractor’s request that the proposed product be considered as an “or equal” in accordance with the General Conditions, accompanied by Contractor’s certifications required in the General Conditions.

- b. Documentation adequate to demonstrate that proposed product does not require revisions to the Contract Documents, that proposed product is consistent with the Contract Documents, and that proposed product will produce results and performance required in the Contract Documents, and that proposed product is compatible with other portions of the Work.
 - c. Detailed comparison of significant qualities of proposed product with the products and manufacturers named in the Contract Documents. Significant qualities include attributes such as performance, weight, size, durability, visual effect, performance and specific features and requirements shown or indicated.
 - d. Evidence that proposed product manufacturer will furnish warranty equal to or better than specified, if any.
 - e. List of similar installations for completed projects with project names and physical addresses of installation along with the names, telephone numbers, email addresses and physical address of design professionals and owners associated with the referenced installation, if requested.
 - f. Samples, if requested.
 - g. Other information requested by Engineer.
- E. Warranties specified for products shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the required correction period. Disclaimers and limitations in specific product warranties do not limit Contractor's general warranty and guarantee.
- 1. Product manufacturer's warranty is preprinted written warranty published by product manufacturer and specifically endorsed by product manufacturer to Owner.
 - 2. Equipment and material shall be guaranteed to be free from defects in workmanship, design, and/or materials for a period of one (1) year unless otherwise specified in the individual Specification Section for a Special Warranty.
 - 3. Warranty period shall start on the date of the particular equipment and material is substantially complete, which includes requirements specified in Section 01 75 00 – Checkout and Startup Procedures for start-up certification and specified elsewhere in the Contract Documents.
 - 4. Warranty requirements may be added to or modified in the individual Specification Sections. Special warranty is written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by product manufacturer's warranty or to provide increased rights to Owner.

- 5. Special warranty information, if any, will be located in the Specification Section for that product.
- F. Requirements for Special Warranties: None.
- G. Submit product manufacturer's warranties and special warranties as submittals in accordance with Schedule of Submittals accepted by Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 75 00
CHECKOUT AND STARTUP PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Checkout of products and equipment.
 - 2. Startup procedures of products and equipment
- B. Contractor shall initially start up and place equipment installed under the Contract into successful operation, in accordance with the equipment manufacturer's written instructions and as instructed by Supplier at the Site.
- C. Provide all material, labor, tools, and equipment required to complete equipment checkout and start-up.
- D. Provide chemicals, lubricants, and other required operating fluids.
- E. General activities include:
 - 1. Cleaning, as required under other provisions of the Contract Documents.
 - 2. Removing temporary protective coatings.
 - 3. Checking and correcting (if necessary) leveling plates, grout, bearing plates, anchorage devices, fasteners, and alignment of piping, conduits, and ducts that may place stress on the connected equipment.
 - 4. All adjustments required.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Definitions:
 - 1. Displacement, as used herein, shall mean total peak-to-peak movement of vibrating equipment, in mils; velocity or speed of the vibration cycle, measured in distance per time, velocity and acceleration of the vibration cycle. Displacement, velocity and acceleration shall be measured by instruments/equipment equal to IRD Mechanalysis, Bentley, Nevada.
- B. Coordination:

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1. Coordinate checkout and start-up with other contractors performing Work at the Site.
2. Do not start up system or subsystem for continuous operation until all components of that system or subsystem, including instrumentation and controls, have been tested to the extent practicable and proven to be operable as intended by the Contract Documents.
3. Responsibility for proper operation is by Contractor.
4. Supplier shall be present during checkout, start-up, and initial operation, except as otherwise specified.
5. Do not start up system, unit process, or equipment without submitting acceptable preliminary operations and maintenance manuals by Contractor, in accordance with Section 01 78 23 – Operations and Maintenance Data.

C. Contractor's Requirements Prior to Owner's Responsibility:

1. Owner will assume responsibility for the equipment upon Substantial Completion.
2. Prior to turning over to Owner responsibility for operating and maintaining system or equipment shall be in accordance with this Section and the following requirements:
 - a. Submit acceptable final operations and maintenance manuals in accordance with Section 01 78 23 – Operations and Maintenance Data.
 - b. Provide training of operations and maintenance personnel in accordance with Section 01 79 00 – Instruction of Owner's Personnel.
 - c. Complete system field quality control testing in accordance with the Contract Documents including, but not limited to, the following:
 - 1) Start-up certification shall be performed and completed by the equipment Supplier for the equipment and material prior to be placed into intended use by Owner as specified in the Contract Documents.
 - 2) Equipment and material shall be operated for a minimum 30-day operational period to verify performance. In addition to specific requirements specified in the individual specification sections, process data that is recorded in the PLC shall be submitted to the Engineer in tabular format showing hourly process performance data. A log of all alarms shall also be submitted, along with notes describing corrective measures applied in response to alarm condition.

- 3) If equipment and material does not perform satisfactorily during the 30-day operational period, then the warranty period start shall be delayed until satisfactory performance is verified.
 - a) Contractor shall repair or replace equipment and material that does not perform satisfactorily at no cost to Owner.
 - b) Contractor shall furnish all equipment and material, labor, and incidentals necessary to provide equipment and material to the performance level required by the Contract Documents.
- d. Obtain from Engineer final certificate of Substantial Completion for either entire Work or the portion being turned over to Owner.

1.03 SUBMITTALS

- A. Startup Schedule: Detailed summary of schedule, duration, manpower requirement, and Contractor's means and methods for startup.
- B. Vibration testing results
- C. Closeout Submittals: Manufacturer's certification of installation in accordance with this Section.
- D. Startup testing and operational demonstration performance data.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 PRELIMINARY REQUIREMENTS

- A. Prior to the start-up of the facilities, Contractor shall have prepared and tested all equipment, subsystems and systems in accordance with the requirements of the individual Specification Section to check its ability for sustained operation, including inspections and adjustments by Manufacturer's representative.
- B. Contractor shall develop and submit schedule in accordance with this Section.
- C. After the facilities are sufficiently complete to permit start-up, Contractor shall furnish the technical representative of the equipment supplier to start-up the facilities. Contractor will be responsible for startup of all facilities constructed under this Contract. During the initial start-up period the Contractor shall check and provide for mechanical operation in accordance with the Contract Documents.

3.02 FIELD QUALITY CONTROL

A. Manufacturers' Field Services:

1. When specified, furnish services of factory trained representatives of material and equipment manufacturers as specified, including supervising installation, adjusting, checkout, start-up, and testing of materials and equipment.
2. Certification:
 - a. When services by manufacturer are required at the Site, within 14 days after first test operation of equipment, submit to Engineer a letter from manufacturer, on manufacturer's letterhead, stating that materials and equipment are installed in accordance with manufacturer's requirements and installation instructions, and in accordance with the Contract Documents.
 - b. Include in the final operations and maintenance manual for the associated equipment a copy of the letter or completed form, as applicable.
3. Manufacturer shall bring any discrepancies to the immediate attention of the Contractor for correction. Contractor shall promptly correct any discrepancies noted by the Manufacturer. Manufacturer shall coordinate correction of discrepancies with the Contractor. Discrepancies and their correction shall be noted in inspection records and in all required reports. Any corrections that result in changes to the work as shown on the Contract Documents shall be approved by the Engineer prior to their execution.

3.03 VIBRATION TESTING

- A. Stationary rotating equipment, products and materials shall have vibration testing performed at the Site with a rated horsepower exceeding 200 horsepower.
- B. Vibration testing shall be performed by an experienced factory-trained and authorized third-party analysis expert shall be provided for and paid for by the Contractor. Each unit or pump system shall be tested separately without duplicate equipment running. All field testing shall be done in the presence of the Owner. The Owner shall be furnished with seven (7) certified copies of vibration test data for each test performed.
- C. General testing requirements:
 1. Variable speed drives – Tests shall be conducted at the full range of speeds between maximum and minimum.
 2. Two-speed drives – Tests shall be conducted at both speeds.
 3. Constant-speed drives – Tests shall be conducted under various loading conditions as determined by the Engineer.

4. Frequency of vibration, in frequency (i.e. Hz, cycles per second) and cycles per minute (cpm), shall be determined when vibration exceeds specified levels or as otherwise necessary. Vibration shall be measured on the bearing housing and the motor, unless other additional locations are deemed necessary by the Engineer and/or specified, the vibration analyst and/or published industry standards.
5. Vibration shall be checked in the radial and axial directions. Vibration shall be limited to the latest version of the following published standards: Hydraulic Institute (HI).
6. For pumps radial vibration shall not exceed that permitted by the Hydraulic Institute Standards except that, at vibration frequencies in excess of 8,000 cpm, the velocity shall not exceed 0.2 in/sec.
7. Noise or vibration in any rotating equipment which the Engineer judges to be excessive or damaging, shall be cause for rejection.

D. Test results:

1. Contractor shall correct deficiencies within thirty days when vibration field test results exceed source quality control tests results, Manufacturer's recommendations, or the limits specified in the Contract Documents.
2. After corrections have been completed, the vibration testing shall be re-run at the Contractor's expense and the results re-submitted to the Engineer for review.

3.04 SYSTEM START-UP

- A. Equipment and materials shall be provided in conformance with the manufacturer's installation instructions and in accordance with the Contract Documents.
- B. Provide start-up services as specified in the individual Specification Sections.
- C. Contractor shall furnish consumables required for startup including, but not limited to, electricity, water, chemicals and lubrication. Contractor shall provide a plan for disposal of water used for testing unless otherwise specified in the Contract Documents.
- D. General system requirements:
 1. Start-up of the plant by Contractor shall include all mechanical systems, including but not limited to, pumps, compressors, and like equipment, and the ventilating, air conditioning (or heating), plumbing, and electrical systems. Start-up of either the heating or air conditioning systems is dependent upon the time of year that the plant start up is initiated. Contractor will be required to return at the beginning of the next heating or air conditioning season (whichever is applicable) to start the appropriate system.

2. Cleaning as required under provisions of the Contract Documents.
3. Remove temporary protective coatings.
4. Flushing and replacing greases and lubricants as required by Manufacturer
5. Lubrication.
6. Verify the following:
 - a. Shaft and coupling alignments and reset where needed.
 - b. Set motor, pump and other equipment rotation, safety interlocks, and belt tensions.
 - c. Leveling plates, grout, bearing plates, anchor bolts, fasteners, and alignment of piping, conduits and ducts that may apply stress on equipment.
7. Valves:
 - a. Tighten packing glands to ensure no leakage but allow valve stems to operate without galling.
 - b. Replace packing in valves to retain maximum adjustment after system is determined to be complete.
 - c. Replace packing on valves that continue to leak.
 - d. Remove and repair bonnets that leak.
 - e. After cleaning, coat packing gland threads and valve stems with surface preparation of "Molycote" or "Fel-Pro".
8. Verify that control valve seats are free of foreign matter and are properly positioned for intended service.
9. Tighten flanges and other pipe joints after system has been placed in operation.
10. Replace gaskets that show signs of leakage after tightening.
11. Inspect all joints for leakage:
 - a. Promptly remake each joint that appears to be faulty; do not wait for rust other corrosion to form.
 - b. Clean threads on both parts and apply compound and remake joints.

12. After system has been placed in operation, clean valve seats and headers in fluid system to ensure freedom from foreign matter.
13. Remove rust, scale, and foreign matter from equipment and renew defaced surfaces.
14. Repair damaged insulation.

END OF SECTION

SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Substantial Completion.
 - 2. Final inspection.
 - 3. Request for final payment.

1.02 REFERENCES

- A. Definitions:
 - 1. Substantial completion procedures for requesting and documenting are in the General Conditions, as modified by Supplemental Conditions.
 - 2. Final inspection procedures for requesting and documenting are in the General Conditions, as modified by Supplemental Conditions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Request for Final Payment:
 - 1. Procedure: Submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions.
- B. Request for final payment shall include:
 - 1. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2. Releases or Waivers of Lien Rights:
 - a. Provide a final release or waiver by Contractor and each Subcontractor and Supplier that provided Contractor with labor, material, or equipment totaling \$10,000 or more.
 - b. Provide list of Subcontractors and Suppliers for which release or waiver of Lien is required.

- c. Each release or waiver of Lien shall be signed by an authorized representative of the entity submitting release or waiver to Contractor, and shall include Subcontractor's or Supplier's corporate seal, when applicable.
 - d. Release or waiver of Lien may be conditional upon receipt of final payment.
 - e. Manufacturer's Affidavit of Release of Liens – furnish a separate, completed form from the manufacturer.
3. Consent of Surety Company to Final Payment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Requirements for operation and maintenance data, manuals, and documentation.
 - 1. Submit operation and maintenance data, in accordance with this Section and in accordance with requirements elsewhere in the Contract Documents, as instructional and reference manuals by operations and maintenance personnel at the Site.
 - 2. Required operation and maintenance data groupings are listed in this Section. At minimum, submit operation and maintenance data for:
 - a. All equipment and systems
 - b. Valves, gates, actuators, and related accessories
 - c. Instrumentation and control devices
 - d. Electrical gear
 - 3. For each operation and maintenance manual, submit the following:
 - a. Preliminary Submittal: Printed and bound copy of entire operation and maintenance manual or electronic copy, except for test data and service reports by Supplier.
 - b. Final Submittal: Printed and bound copy of complete operations and maintenance manual and electronic copy, including test data and service reports by Supplier.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Quantity Required and Timing of Submittals:
 - 1. Preliminary Submittal:
 - a. Printed Copies: One copy, exclusive of copies required by Contractor.
 - b. Electronic Copies: One copy.

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- c. Submit to Engineer, whichever occurs first:
 - 1) 60 days prior to starting training of operations and maintenance personnel.
 - 2) 30 days prior to field quality control testing at the Site.
 - d. Furnish preliminary operation and maintenance data submittal in acceptable form and content, as determined by Engineer, before associated materials and equipment will be eligible for payment.
- 2. Preliminary Submittal shall be reviewed by Engineer. One printed or electronic copy shall be returned to Contractor with required revisions noted.
 - 3. Final Submittal: Provide 14 days prior to checkout and startup procedures specified in Section 01 75 00 – Checkout and Startup Procedures, unless Submittal is specified as required prior to an interim Milestone.
 - a. Printed Copies: Two copies.
 - b. Electronic Copies: One copy.

B. Format of Printed Copies:

- 1. Binding and Cover:
 - a. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be minimum one-inch wide and maximum of three-inch wide. Binders for each copy of each volume shall be identical.
 - b. Provide the following information on cover of each volume:
 - 1) Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - 2) Name or type of material or equipment covered in the manual.
 - 3) Volume number, if more than one volume is required, listed as "Volume ___ of ___", with appropriate volume-designating numbers filled in.
 - 4) Name of Project and, if applicable, Contract name and number.
 - 5) Name of building or structure, as applicable.
 - c. Provide the following information on spine of each volume:

- 1) Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
- 2) Name or type of material or equipment covered in the manual.
- 3) Volume number, if more than one volume is required, listed as "Volume ___ of ___", with appropriate volume-designating numbers filled in.
- 4) Project name and building or structure name.

2. Drawings:

- a. Bind into the manual drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size, with reinforcing.
- b. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Include no more than three drawing sheets per pocket.

3. Copy Quality and Document Clarity:

- a. Contents shall be original-quality copies. Documents in the manual shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color.
- b. Clearly mark in ink to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished or cross out inapplicable content.

4. Organization:

- a. Provide table of contents in each volume for each chapter or section.
- b. Use dividers and indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

C. Format of Electronic Copies:

1. Each electronic copy shall include all information included in the corresponding printed copy.
2. Submit electronic copy via transferable method and format acceptable to Engineer.

3. File Format:
 - a. Acceptable formats include Adobe PDF, Microsoft Word, Autodesk DWF, and AutoCAD.
 - b. Files shall be electronically searchable.
 - c. Submit separate file for each separate document in the printed copy.
 - d. Within each file, provide bookmarks for the following:
 - 1) Each chapter and subsection listed in the corresponding printed copy document's table of contents
 - 2) Each figure
 - 3) Each table
 - 4) Each appendix
4. Submit drawings and figures in one of the following formats: ".bmp", ".tif", ".jpg", ".gif", "dwf", or "dwg".

D. General Content Requirements:

1. Prepare each operations and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-built drawings as applicable, bills of materials, technical bulletins, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.
2. Submit complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
3. Submit written explanations of all safety considerations relating to operation and maintenance procedures.
4. Submit complete, detailed, written preventive maintenance instructions including all information and instructions to keep materials, equipment, and

systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:

- a. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Include pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.
 - b. Recommended schedule for each preventive maintenance task.
 - c. Lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 - d. Table of alternative lubricants.
 - e. Troubleshooting instructions.
 - f. List of required maintenance tools and equipment.
5. Submit complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
- a. Manufacturer's name, address, telephone number, fax number, and Internet website address.
 - b. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.
 - c. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
 - d. For each part or piece include the following information:
 - 1) Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - 2) Part name or description.
 - 3) Manufacturer's part number.

- 4) Quantity of each part used in each assembly.
 - 5) Current unit price of the part at the time the operations and maintenance manual is submitted. Price list shall be dated.
6. Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number).
 7. Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
 8. Submit manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Where materials pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
 9. Submit original-quality copies of each approved and accepted Shop Drawing, product data, and other submittal, updated to indicate as-installed condition. Reduced drawings are acceptable only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
 10. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
 11. Submit copy of warranty bond and service contract as applicable.
 12. When copyrighted material is used in operations and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

1.03 SUBMITTALS

- A. Action/Informational Submittals: Submit preliminary schedule (listing) of operations and maintenance data for Engineer's review. Preliminary operations and maintenance data shall be grouped as major equipment and material systems and divided into sub-systems as required for clarity, subject to Engineer's approval.
- B. Closeout Submittals: Operation and maintenance data: Submit the operations and maintenance data indicated in the Contract Documents, grouped into submittals as approved by Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for recording changes to record documents.
2. Requirements for electronic files furnished by Engineer.

B. Contractor shall maintain and submit to Engineer with record documents in accordance with the Specifications, General Conditions, and Supplementary Conditions.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Maintenance of Record Documents:

1. The following record documents shall be maintained in the Contractor's field office:
 - a. Drawings, Specifications, and Addenda.
 - b. Shop Drawings, Samples, and other Contractor submittals, including records of test results, approved or accepted as applicable, by Engineer.
 - c. Change Orders, Work Change Directives, Field Orders, photographic documentation, survey data, and all other documents pertinent to the Work.
2. Update record documents on a monthly basis, minimum.
3. Provide files and racks for proper storage and easy access to record documents.
4. Make record documents available for inspection upon request of Engineer or Owner.
5. Do not use record documents for purpose other than serving as Project record. Do not remove record documents from Contractor's field office without Engineer's approval.

B. Submittal of Record Documents:

1. Submit to Engineer the following record documents: Drawings.

2. Prior to readiness for final payment, submit to Engineer one copy of final record documents. Submit complete record documents; do not make partial submittals.
3. Submit record documents with transmittal letter on contractor letterhead complying with letter of transmittal requirements in Section 01 33 00 – Submittal Procedures.
4. Record documents submittal shall include certification, with original signature of official authorized to execute legal agreements on behalf of Contractor.

C. Electronic Files Furnished by Engineer:

1. CADD files will be furnished by Engineer upon the following conditions:
 - a. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CADD files and providing specific definition(s) or description(s) of how files will be used, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.
 - b. Contractor shall execute Engineer's standard agreement for release of electronic files and shall abide by all provisions of the agreement for release of electronic files.
 - c. Layering system incorporated in CADD files shall be maintained as transmitted by Engineer. CADD files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor shall restore all layers and cross-references prior to submitting record documents to Engineer.
 - d. Contractor shall submit record drawings to Engineer in same CADD format that files were furnished to Contractor.

1.03 SUBMITTALS

- A. Closeout Submittals: Provide record documentation as specified in this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS:

- A. At the start of the Project, label each record document to be submitted as, "PROJECT RECORD" using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.

- B. Keep record documents current. Make entries on record documents within two working days of receipt of information required to record the change.
- C. Do not permanently conceal the Work until required information has been recorded.
- D. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from Engineer-accepted record documents.
- E. Marking of Entries:
 - 1. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to record documents.
 - 2. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files.
 - 3. Date all entries on record documents.
 - 4. Call attention to changes by drawing a “cloud” around the change(s) indicated.
 - 5. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

3.02 RECORDING CHANGES TO DRAWINGS:

- A. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced drawings as a substitute for recording changes on the Drawings is unacceptable.
- B. Record changes on plans, sections, schematics, and details as required for clarity, making reference dimensions and elevations (to Project datum) for complete record documentation.
- C. Record actual construction including:
 - 1. Depths of various elements of foundation relative to Project datum.
 - 2. Field changes of dimensions, arrangements, and details.
 - 3. Changes made in accordance with Change Orders, Work Change Directives, and Field Orders.
 - 4. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document changes.

3.03 RECORDING CHANGES FOR SCHEMATIC LAYOUTS:

- A. In some cases, on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.
- B. Record on record documents all revisions to schematics on Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Contract. Record actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
- C. When dimensioned plans and dimensioned sections on the Drawings show the Work schematically, indicate on the record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items
 - 1. Clearly identify the Work item by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.
 - 2. Show by symbol or note the vertical location of Work item; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also provide elevation dimension relative to Project datum.
 - 3. Descriptions shall be sufficiently detailed to be related to Specifications.
- D. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans and sections when, in Engineer’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on waiver(s) being issued.

3.04 REQUIREMENTS FOR SUPPLEMENTAL DRAWINGS:

- A. In some cases, drawings produced during construction by Engineer or Contractor supplement the Drawings and shall be included with record documents submitted by Contractor. Supplemental record drawings shall include drawings provided with Change Orders, Work Change Directives, and Field Orders and that cannot be incorporated into the Drawings due to space limitations.
- B. Supplemental drawings provided with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
- C. When supplemental drawings developed by Contractor using computer-aided drafting/design (CADD) software are to be included in record drawings, submit electronic files for such drawings in AutoCAD (latest version) as part of record drawing submittal.

3.05 RECORDING CHANGES TO SPECIFICATIONS AND ADDENDA:

A. Mark each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually provided.
2. Changes made by Addendum, Change Orders, Work Change Directives, and Field Orders.

END OF SECTION

SECTION 03 30 05
CONCRETE AND GROUT

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the ENGINEER, all in accordance with the Contract Documents.

- B. The following types of concrete shall be covered in this Section:
 - 1. Structural Concrete (Class A): Concrete to be used in all cases except where noted otherwise in the Contract Documents.

 - 2. Sitework Concrete (Class B): Concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise shown or noted on the Drawings.

- C. The following types of grout are covered in this Section:
 - 1. Cement Grout: This type of grout shall be used for grout toppings and for patching of fresh concrete.

 - 2. Non-Shrink Grout: Non-shrink grout shall be used for grouting beneath base plates of structural metal framing.

 - 3. Epoxy Grout: This type of grout shall be used for bonding new concrete to hardened concrete.

 - 4. Epoxy Base Plate Grout: This type of grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy machinery, etc.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

- B. Commercial Standards:

ACI 214	Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements of Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM C 31	Test Methods for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 88	Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 114	Method for Chemical Analysis of Hydraulic Cement
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregate
ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C156	Test Method for Water Retention by concrete Curing Materials
ASTM C 157	Test Method for length Change of Hardened Cement Mortar and Concrete
ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 192	Method of Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 227	Standard Test Method for Potential Alkali Reactivity of Cement Aggregate Combinations (Mortar-Bar Method).
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 289	Standard Test Method for Potential Reactivity of Aggregates (Chemical Method)
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 579	Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacing.
ASTM C 595	Standard Specification for Blended Hydraulic Cements
ASTM C 618	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
ASTM C 827	Test Method for Early Volume Change of Cementitious Mixtures.
ASTM C 989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
CRD C 621	Non-Shrink Grout
CRSI	Manual of Standard Practice.

- C. Any procedure, materials or operation specified by reference to the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), Building Code or other references shall comply with the requirements of the current and most recent specifications or standards. In conflicts between listed standards and this specification, the more stringent requirements shall govern.
- D. The CONTRACTOR is expected to obtain the most recent issue of all standards, recommendations, codes or specifications referred to within this specification.

1.03 SUBMITTALS

- A. Concrete Mix Designs: The design mixes to be used shall be prepared by qualified persons and submitted for review. The design of the mix is the responsibility of the CONTRACTOR subject to the limitations of the specifications. Review processing of this submission will be required only as evidence the mix has been designed by qualified persons and that the minimum requirements of the specifications have been met. Such review will in no way alter the responsibility of the CONTRACTOR to furnish concrete meeting the requirements of the specifications. If in the progress of the work the sources of materials change in characteristics or the CONTRACTOR requests a new source in writing, the CONTRACTOR shall, at his expense submit new test data and information for the establishment of a new design mix. Submit mix designs for all classes of concrete to be used under this Contract. Mix design submittals shall include the following:
 1. Sources of all materials and certifications of compliance with specifications for all sources of each material.
 2. Certified current (less than one year old) chemical analysis of Portland Cement or Blended Cement to be used.

3. Certified current (less than one year old) chemical analysis of fly ash or slag cement to be used.
 4. Aggregate test results showing compliance with required standards, i.e. sieve analysis, aggregate soundness tests, etc.
 5. Manufacturer's data on all admixtures stating compliance with required standards and are compatible with one another. Written conformance to the above-mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to Mix design review by the ENGINEER.
 6. Field experience records and/or trial mix data for the proposed concrete mixes.
- B. Grout: The CONTRACTOR shall submit shop drawings for all types of grout for use in this Project. Shop drawings shall include certified test results verifying the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.
- C. Accessories: The CONTRACTOR shall submit shop drawings for all types of concrete accessories to be used for this project including, but not limited to, form ties, water stops, joint materials and curing agents.
- D. Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall submit delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the State certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.
- E. Reinforcing Steel: The CONTRACTOR shall submit shop drawings of shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication.
1. The CONTRACTOR shall submit detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66) for all reinforcing steel. These drawings shall be made to such a scale as to clearly show joint locations, openings, the arrangement, spacing and splicing of the bars. Where opening sizes are dependent on equipment selection the CONTRACTOR shall indicate all necessary dimensions to define steel lengths and placing details.

2. Details of the concrete reinforcing steel and concrete inserts shall be submitted by the CONTRACTOR at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed. Said details of reinforcing steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop Drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.
3. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
4. Proposed supports for each type of reinforcing.
5. Certification that all installers of dowel adhesives are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.
6. International Code Council-Evaluation Services Evaluation Services Report (ICC-ES ESR) for dowel adhesives.

F. Curing: Submit the following:

1. Proposed procedures for protection of concrete under wet weather placement conditions.
2. Proposed normal procedures for protection and curing of concrete.
3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
4. Proposed method of measuring concrete surface temperature changes.
5. Manufacturer's literature and material certification for proposed curing compounds.

1.04 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be as specified in Part 2 – Products.
- B. The cost of initial trial mixes and initial laboratory tests to design the mixes including compression tests, sieve analysis, and tests on trial mixes shall be included in the Contract Price.
- C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the OWNER. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications.

- D. Field quality control tests, as specified in Article 1.05, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.
- E. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the OWNER, and the CONTRACTOR shall provide assistance to the ENGINEER in obtaining samples. The CONTRACTOR shall dispose of and clean up all excess material.
- F. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 347.

1.05 QUALITY CONTROL

- A. Compressive Strength
 - 1. Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the ENGINEER to insure continued compliance with these Specifications. At least one set of test specimens shall be made for each placement, or for each fifty (50) cubic yards of concrete placed, or for each 5000 square feet of surface area for slabs or walls, whichever is greater.
 - 2. Samples of freshly mixed concrete shall be obtained in accordance with ASTM C 172, and compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall consist of at least five 6-inch diameter by 12-inch high cylinders, or eight 4-inch diameter by 8-inch high cylinders. Each cylinder shall be identified by a tag attached to the side of the cylinder.
 - 3. The CONTRACTOR shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the CONTRACTOR. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete requiring inspection shall

be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.

4. Compression test shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at 7 days and 2 at 28 days. For 4x8 cylinders, three test cylinders will be tested at 7 days and three at 28 days. The remaining cylinders will be held to verify test results, if needed.

B. Consistency

1. Consistency of the concrete will be checked by the ENGINEER by standard slump cone tests. The CONTRACTOR shall make any necessary adjustments in the mix as the ENGINEER may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for delays, material or labor costs due to such eventualities.
2. Slump tests shall be made in accordance with ASTM C 143. Slump tests shall be performed as deemed necessary by the ENGINEER and each time compressive strength samples are taken.

C. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the ENGINEER in accordance with ASTM C 231.
2. Air content tests will be performed as deemed necessary by the ENGINEER and each time compressive strength samples are taken.

D. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 215 and ACI 318, Chapter 5 "Concrete Quality Mixing and Placing", and as specified herein.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
3. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at the cost of the CONTRACTOR. Additional testing may also be required to verify compressive strength of concrete. Additional testing shall involve extraction and testing of concrete cores in accordance with ASTM C 42. ENGINEER shall determine locations where concrete cores shall be taken. Nondestructive test methods shall not be used to verify strength of in-place concrete.

PART 2 – PRODUCTS

2.01 FORMWORK

A. Forms and Falsework:

1. All forms shall be smooth surface forms unless otherwise specified.
2. Wood materials for concrete forms and falsework shall be new material and shall conform to the following requirements:
 - a. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
 - b. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
3. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

B. Formwork Accessories:

1. Unless otherwise shown, exterior corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
2. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming.
3. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "Bug Holes" in cast-in-place concrete.

2.02 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of ACI 301.
- D. Hydraulic Cement: Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.
 - 1. Portland Cement
 - a. Portland Cement shall be Type II conforming to ASTM C 150.
 - b. For concrete mixed with only Portland Cement, the total alkalis in the cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.40%
 - c. For concrete mixed with Portland Cement and an appropriate amount of fly ash or slag cement the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%.
 - 2. Blended Cement
 - a. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.
 - b. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
 - c. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.

- d. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 E and 2.02 F, respectively.

E. Fly Ash

1. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.
2. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.
3. When fly ash is used, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash.

F. Slag Cement

1. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.
2. When slag cement is used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag.
3. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

G. Water

1. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/1 TDS) shall not be used.
2. Water shall not contain more than 100 PPM chloride.
3. Water shall not contain more than 500 PPM dissolved solids.
4. Water shall have a pH in the range of 4.5 to 8.5.
5. Water shall meet requirements of ASTM C 1602.

H. Aggregates

1. Aggregates shall be obtained from pits acceptable to the ENGINEER, shall be nonreactive, and shall conform to the FBC and ASTM C 33. Lightweight sand for fine aggregate will not be permitted. Maximum size of coarse aggregate shall be as specified herein.
2. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33
3. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.
4. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.
5. When tested for soundness in accordance with ASTM C 88, the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.
6. When tested in accordance with "Potential Reactivity of Aggregates (Chemical Method)" (ASTM C 289), the ratio of silica released to reduction in alkalinity shall not exceed 1.0.
7. When tested in accordance with "Organic Impurities in Sands for Concrete" (ASTM C 40), the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.
8. When tested in accordance with "Resistance to Abrasion of Small size Coarse Aggregate by Use of the Los Angeles Machine" (ASTM C 131), the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.
9. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed

I. Admixtures

1. Air-entraining Admixture shall be added to all concrete unless noted otherwise. Air-entraining admixture meeting the requirements of ASTM C 260 shall be used. The ENGINEER reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

2. Water reducing and retarding admixtures shall be required at the ENGINEER's discretion or, if not required, may be added at the CONTRACTOR's option to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at no additional cost to the OWNER. The use of an admixture shall be subject to acceptance by the ENGINEER. Admixtures permitted shall conform to the requirements of ASTM C 494 (chemical admixtures). Admixtures shall contain no free chloride ions, be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air entraining admixture.

2.03 CURING MATERIALS

- A. Materials for curing concrete conform to ASTM C 309 Type 1-D, Class B with a minimum solids content of 30% and shall contain a fugitive dye. Curing compound shall be SureCure 30 by Kaufman Products, Inc., CA D.O.T. Acrylic Cure by Symons Corporation, Sealtight CS-309-30 by W. R. Meadows, or approved equal.
- B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of 6 mils.

2.04 JOINT MATERIALS

- A. Materials for joints in concrete above grade nonhydraulic structures shall conform to the following requirements:
 1. Preformed joint filler shall be a non-extruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.
 2. Joint sealer shall be in accordance to Section 07 90 00 – Sealants and Caulking.

2.05 REINFORCING STEEL

- A. General: All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:
 1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement, and shall be manufactured in the United States. All reinforcing steel shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on the Drawings
 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings; provided, that welded wire fabric with longitudinal wire of W9.5 size wire shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded

wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only. All welded wire fabric reinforcement shall be galvanized.

- B. Field welding of reinforcing steel will not be allowed
- C. Accessories: Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).
- D. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

2.06 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.
- B. All holes shall be drilled in accordance with the manufacturer's instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer's requirements.
- C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer's instructions prior to installation of adhesive and reinforcing bar.
- D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.
- E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer's instructions.
- F. Embedment Depth:
 - 1. The embedment depth of the bar shall be as show on the Drawings. Although all manufacturers listed below are permitted, the embedment depth shown on the Drawings is based on "SET-XP" by Simpson Strong-Tie Co. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.
 3. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.
- G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.
- H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete, must comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report. The adhesive system shall be "Epcon System C6+ Adhesive Anchoring System" as manufactured by ITW Redhead, " HIT-HY 200 Injection Adhesive Anchor System" as manufactured by Hilti, Inc. "SET-XP" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable.
- I. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

2.07 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall conform to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

2.08 GROUT

- A. Cement Grout
1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one-part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength

requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

2. The minimum compressive strength at 28 days shall be 4000 psi.
3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.
4. Sand shall conform to the requirements of ASTM C33.

B. Non-Shrink Grout

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28-day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, "Conspec 100 Non-Shrink Non-Metallic Grout" by Conspec, "MasterFlow 928" by BASF Corporation.

C. Epoxy Grout

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, "MasterEmaco ADH 1090 RS" by BASF Corporation.
2. Epoxy grout shall be modified as required for each application with aggregate per manufacturer's instructions.

D. Epoxy Base Plate Grout

1. Epoxy base plate grout shall be "Sikadur 42, Grout-Pak" by Sika Corporation, or "MasterFlow 648" by BASF Corporation.

2.09 CONCRETE DESIGN REQUIREMENTS

- A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed.

Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

- B. The CONTRACTOR is cautioned that the limiting parameters specified below are not design mixes. Additional cement or water reducing agent may be required to achieve workability demanded by the CONTRACTOR's construction methods. The CONTRACTOR is responsible for any costs associated with furnishing concrete with the required workability. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)

Concrete Class A	4,000 psi (minimum)
Concrete Class B	3,000 psi (minimum)

2. Water/cementitious materials ratio, by weight

	Maximum	Minimum
Concrete Class A	0.45	0.39
Concrete Class B	0.50	0.39

3. Slump range

- a. 4" nominal unless high range water reducing admixture is used
- b. 8" max if high range water reducing admixture is used.

4. Air Content

Concrete Class A	6% ±1.5%
Concrete Class B	3% Max (non air-entrained)

PART 3 – EXECUTION

3.01 GENERAL FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed and replaced at the CONTRACTOR's expense. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with the FBC, ACI 347 and the requirements specified herein.

- B. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

3.02 FORMWORK CONSTRUCTION

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for by the ENGINEER.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the ENGINEER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete.
- C. Form Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

3.03 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

3.04 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-day strength of the concrete as specified herein. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the ENGINEER.

3.05 FABRICATION OF REINFORCING STEEL

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the ENGINEER. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the ENGINEER.

3.06 PLACING REINFORCING STEEL

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Bars additional to those shown which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- E. Reinforcement placing tolerances shall be within the limits specified in ACI 318, unless otherwise directed by the ENGINEER.
- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown.
- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks

(dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.07 SPLICING

- A. Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the ENGINEER.
- B. Lap length for reinforcement bars shall be in a Class B Splice in accordance with ACI 318, unless otherwise shown. Laps of welded wire fabric shall be in accordance with the ACI 318.

3.08 CLEANING AND PROTECTION OF REINFORCING STEEL

- A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be reinspected and, if necessary, recleaned.

3.09 PREPARATION OF SURFACES FOR CONCRETING

- A. General: No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the ENGINEER. The CONTRACTOR shall notify the ENGINEER not less than two working days prior to concrete placement, allowing for inspection and any corrective measures which are required. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting, followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by hydroblasting. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provided that construction joints shall be made only where acceptable to the ENGINEER.
- E. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the ENGINEER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- G. Casting Against Old Concrete: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydro-blasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.
- H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the ENGINEER.
- I. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- J. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items, and any part of the concrete reinforcement will not be permitted.

- K. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.10 MIXING, HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.
- B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.
- D. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- E. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the OWNER. The CONTRACTOR shall notify the ENGINEER in writing at least 24 hours in advance of placement of any concrete.
- F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screened in an up-slope direction.
- G. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing, and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.

- H. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4 inch thick shall be tacked to the forms on these surfaces. The concrete shall be carded about 1/2 inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.
- I. Conveyor Belts and Chutes: All end of chutes, hopper gates and all other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete, at the places of deposit, is visible from the deck or runway.
- J. Temperature of Concrete: The temperature of concrete, when it is being placed, shall not be more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in whether during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessarily to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

3.11 PUMPING OF CONCRETE

- A. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. The minimum diameter of the hose (conduits) shall be 4 inches.
- C. Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand shall not be over 3.00.

3.12 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 or 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.13 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. Formed Surfaces: After removal of forms, the finishes described below shall be applied in accordance with Article 3.13, D. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The ENGINEER shall be the sole judge of acceptability of all concrete finish work.
 - 1. Type I - Rough: All fins, burrs and other projections left by the forms shall be removed. All holes left by removal of ends of ties, and all other holes, depressions, or voids shall be filled solid with cement grout after first being thoroughly wetted. Honeycombs shall be chipped back to solid concrete as directed, prior to patching with cement grout. Holes shall be filled with a small tool that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface. At locations where concrete coatings are specified to be applied, epoxy based patch material or filler surfaces compatible with the coating

shall be used in lieu of cement grout specified herein. Concrete finish shall be in strict conformance to the coating / paint manufacturer's recommendations.

2. Type II - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Any surplus shall be removed by scraping and then rubbing with clean burlap. The finish shall be kept damp for at least 36 hours after application.
 3. Type III - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type I finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted.
- C. Unformed Surfaces: The finishes described below shall be applied to unformed surfaces such as floors, slabs, flow channels and top of walls in accordance with Article 3.05 - Concrete Finish Schedule. The ENGINEER shall be the sole judge of acceptability of all such finish work.
1. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be applied, the surface of the screeded concrete shall be roughened with a concrete rake to 1/2" minimum deep grooves prior to final set.
 2. Type "B" - Wood Floated: This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood float until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. The finished surface shall be true, even, and free from blemishes and other irregularities.
 3. Type "C" - Cork Floated: This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.
 4. Type "D" - Steel Troweled: This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine

material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. In areas, which are to receive a floor covering such as tile, resilient flooring, or carpeting, only one troweling operation is required. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.

5. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish.
6. Type "F" - Swept in Grout Topping: This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03315 shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the CONTRACTOR shall notify the ENGINEER and the equipment manufacturer of the details of the operation and obtain approval and recommendations of the equipment manufacturer.
7. Type "G" - Hardened Finish: Either a liquid hardened finish or an aggregate hardened finish shall be provided at the CONTRACTOR's option.
 - a. Liquid hardened finish shall be provided by application of a liquid floor hardener. Floors to receive this finish shall have previously received a Type "D" finish. Liquid hardener shall be applied between 30 to 60 days after concrete placement. Surface to be treated shall be dry, clean and free of all loose dust, dirt, oil, wax, sealers and curing compounds. Application procedure shall be in accordance with manufacturer's instructions and shall consist of a three-coat treatment.
 - b. Aggregate hardened finish shall be provided by applying an aggregate floor hardener concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.
8. Type "H" - Non-Slip Finish: This finish shall be provided by applying a non-slip shake-on aggregate concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.
9. Type "J" - Raked Finish: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of +/-1/4-inch.

D. CONCRETE FINISH SCHEDULE

Item	Type of Finish
Exterior concrete walls below grade	I
Exterior exposed concrete walls and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere	II
All interior exposed concrete vertical surfaces in buildings	III
Interior exposed ceiling, including beams	III
Slabs to receive roofing material or waterproof membranes	B
All interior finish floors of buildings and structures and walking surfaces which will be continuously or intermittently wet	C
All interior finish floors of buildings and structures which are not continuously or intermittently wet	D
Floors to receive tile, resilient flooring, or carpeting	D
Exterior concrete sidewalks, steps, ramps, decks, slabs on grade and landings exposed to weather	E
Precast concrete form panels, hollow core planks, double tees	J

3.14 CURING AND DAMPPROOFING

- A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following paragraphs.

FINISH SCHEDULE

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
Unstripped forms	1
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	4

- B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 4.
- C. Method 2: The surface shall be covered With burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been

placed. No curing compound shall be applied to surfaces cured under Method 2.

- D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.
- E. Method 4: The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturers printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.
- F. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
- G. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by hydroblasting just prior to the placing of new concrete.
- H. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sand blasted to remove the curing compound, following which repairs shall be made as provided herein.

3.15 PROTECTION

- A. The CONTRACTOR shall protect all concrete against injury until final acceptance by the ENGINEER. Fresh concrete shall be protected from damage due to rain. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.16 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive

voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.

- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. The material used for repair proposed shall be acceptable to the ENGINEER.
- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed, but shall be repaired in an approved manner with dry-packed cement grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.17 CARE AND REPAIR OF CONCRETE

- A. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the OWNER. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR's expense. This stipulation includes concrete experiencing cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the ENGINEER. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the ENGINEER, unless other means or repair are deemed necessary and approved by the ENGINEER.

3.18 GROUT INSTALLATION

- A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.

- B. The CONTRACTOR through the manufacturer of non-shrink grout, epoxy grout, and epoxy base plate grout shall provide on-site technical assistance upon request, at no additional cost to the OWNER.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION

SECTION 03 30 05
CONCRETE AND GROUT

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the ENGINEER, all in accordance with the Contract Documents.
- B. The following types of concrete shall be covered in this Section:
1. Structural Concrete (Class A): Concrete to be used in all cases except where noted otherwise in the Contract Documents.
 2. Sitework Concrete (Class B): Concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise shown or noted on the Drawings.
- C. The following types of grout are covered in this Section:
1. Cement Grout: This type of grout shall be used for grout toppings and for patching of fresh concrete.
 2. Non-Shrink Grout: Non-shrink grout shall be used for grouting beneath base plates of structural metal framing.
 3. Epoxy Grout: This type of grout shall be used for bonding new concrete to hardened concrete.
 4. Epoxy Base Plate Grout: This type of grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy machinery, etc.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
- B. Commercial Standards:

ACI 214	Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements of Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM C 31	Test Methods for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 88	Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 114	Method for Chemical Analysis of Hydraulic Cement
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregate
ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C156	Test Method for Water Retention by concrete Curing Materials
ASTM C 157	Test Method for length Change of Hardened Cement Mortar and Concrete
ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 192	Method of Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 227	Standard Test Method for Potential Alkali Reactivity of Cement Aggregate Combinations (Mortar-Bar Method).
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 289	Standard Test Method for Potential Reactivity of Aggregates (Chemical Method)
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 579	Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacing.
ASTM C 595	Standard Specification for Blended Hydraulic Cements
ASTM C 618	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
ASTM C 827	Test Method for Early Volume Change of Cementitious Mixtures.
ASTM C 989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
CRD C 621	Non-Shrink Grout
CRSI	Manual of Standard Practice.

- C. Any procedure, materials or operation specified by reference to the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), Building Code or other references shall comply with the requirements of the current and most recent specifications or standards. In conflicts between listed standards and this specification, the more stringent requirements shall govern.
- D. The CONTRACTOR is expected to obtain the most recent issue of all standards, recommendations, codes or specifications referred to within this specification.

1.03 SUBMITTALS

- A. Concrete Mix Designs: The design mixes to be used shall be prepared by qualified persons and submitted for review. The design of the mix is the responsibility of the CONTRACTOR subject to the limitations of the specifications. Review processing of this submission will be required only as evidence the mix has been designed by qualified persons and that the minimum requirements of the specifications have been met. Such review will in no way alter the responsibility of the CONTRACTOR to furnish concrete meeting the requirements of the specifications. If in the progress of the work the sources of materials change in characteristics or the CONTRACTOR requests a new source in writing, the CONTRACTOR shall, at his expense submit new test data and information for the establishment of a new design mix. Submit mix designs for all classes of concrete to be used under this Contract. Mix design submittals shall include the following:
1. Sources of all materials and certifications of compliance with specifications for all sources of each material.
 2. Certified current (less than one year old) chemical analysis of Portland Cement or Blended Cement to be used.

3. Certified current (less than one year old) chemical analysis of fly ash or slag cement to be used.
 4. Aggregate test results showing compliance with required standards, i.e. sieve analysis, aggregate soundness tests, etc.
 5. Manufacturer's data on all admixtures stating compliance with required standards and are compatible with one another. Written conformance to the above-mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to Mix design review by the ENGINEER.
 6. Field experience records and/or trial mix data for the proposed concrete mixes.
- B. Grout: The CONTRACTOR shall submit shop drawings for all types of grout for use in this Project. Shop drawings shall include certified test results verifying the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.
- C. Accessories: The CONTRACTOR shall submit shop drawings for all types of concrete accessories to be used for this project including, but not limited to, form ties, water stops, joint materials and curing agents.
- D. Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall submit delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the State certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.
- E. Reinforcing Steel: The CONTRACTOR shall submit shop drawings of shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication.
1. The CONTRACTOR shall submit detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66) for all reinforcing steel. These drawings shall be made to such a scale as to clearly show joint locations, openings, the arrangement, spacing and splicing of the bars. Where opening sizes are dependent on equipment selection the CONTRACTOR shall indicate all necessary dimensions to define steel lengths and placing details.

2. Details of the concrete reinforcing steel and concrete inserts shall be submitted by the CONTRACTOR at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed. Said details of reinforcing steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop Drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.
3. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
4. Proposed supports for each type of reinforcing.
5. Certification that all installers of dowel adhesives are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.
6. International Code Council-Evaluation Services Evaluation Services Report (ICC-ES ESR) for dowel adhesives.

F. Curing: Submit the following:

1. Proposed procedures for protection of concrete under wet weather placement conditions.
2. Proposed normal procedures for protection and curing of concrete.
3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
4. Proposed method of measuring concrete surface temperature changes.
5. Manufacturer's literature and material certification for proposed curing compounds.

1.04 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be as specified in Part 2 – Products.
- B. The cost of initial trial mixes and initial laboratory tests to design the mixes including compression tests, sieve analysis, and tests on trial mixes shall be included in the Contract Price.
- C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the OWNER. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications.

- D. Field quality control tests, as specified in Article 1.05, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.
- E. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the OWNER, and the CONTRACTOR shall provide assistance to the ENGINEER in obtaining samples. The CONTRACTOR shall dispose of and clean up all excess material.
- F. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 347.

1.05 QUALITY CONTROL

- A. Compressive Strength
 - 1. Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the ENGINEER to insure continued compliance with these Specifications. At least one set of test specimens shall be made for each placement, or for each fifty (50) cubic yards of concrete placed, or for each 5000 square feet of surface area for slabs or walls, whichever is greater.
 - 2. Samples of freshly mixed concrete shall be obtained in accordance with ASTM C 172, and compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall consist of at least five 6-inch diameter by 12-inch high cylinders, or eight 4-inch diameter by 8-inch high cylinders. Each cylinder shall be identified by a tag attached to the side of the cylinder.
 - 3. The CONTRACTOR shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the CONTRACTOR. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete requiring inspection shall

be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.

4. Compression test shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at 7 days and 2 at 28 days. For 4x8 cylinders, three test cylinders will be tested at 7 days and three at 28 days. The remaining cylinders will be held to verify test results, if needed.

B. Consistency

1. Consistency of the concrete will be checked by the ENGINEER by standard slump cone tests. The CONTRACTOR shall make any necessary adjustments in the mix as the ENGINEER may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for delays, material or labor costs due to such eventualities.
2. Slump tests shall be made in accordance with ASTM C 143. Slump tests shall be performed as deemed necessary by the ENGINEER and each time compressive strength samples are taken.

C. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the ENGINEER in accordance with ASTM C 231.
2. Air content tests will be performed as deemed necessary by the ENGINEER and each time compressive strength samples are taken.

D. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 215 and ACI 318, Chapter 5 "Concrete Quality Mixing and Placing", and as specified herein.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
3. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at the cost of the CONTRACTOR. Additional testing may also be required to verify compressive strength of concrete. Additional testing shall involve extraction and testing of concrete cores in accordance with ASTM C 42. ENGINEER shall determine locations where concrete cores shall be taken. Nondestructive test methods shall not be used to verify strength of in-place concrete.

PART 2 – PRODUCTS

2.01 FORMWORK

A. Forms and Falsework:

1. All forms shall be smooth surface forms unless otherwise specified.
2. Wood materials for concrete forms and falsework shall be new material and shall conform to the following requirements:
 - a. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
 - b. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
3. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

B. Formwork Accessories:

1. Unless otherwise shown, exterior corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
2. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming.
3. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "Bug Holes" in cast-in-place concrete.

2.02 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of ACI 301.
- D. Hydraulic Cement: Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.
 - 1. Portland Cement
 - a. Portland Cement shall be Type II conforming to ASTM C 150.
 - b. For concrete mixed with only Portland Cement, the total alkalis in the cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.40%
 - c. For concrete mixed with Portland Cement and an appropriate amount of fly ash or slag cement the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%.
 - 2. Blended Cement
 - a. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.
 - b. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
 - c. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.

- d. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 E and 2.02 F, respectively.

E. Fly Ash

1. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.
2. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.
3. When fly ash is used, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash.

F. Slag Cement

1. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.
2. When slag cement is used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag.
3. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

G. Water

1. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/1 TDS) shall not be used.
2. Water shall not contain more than 100 PPM chloride.
3. Water shall not contain more than 500 PPM dissolved solids.
4. Water shall have a pH in the range of 4.5 to 8.5.
5. Water shall meet requirements of ASTM C 1602.

H. Aggregates

1. Aggregates shall be obtained from pits acceptable to the ENGINEER, shall be nonreactive, and shall conform to the FBC and ASTM C 33. Lightweight sand for fine aggregate will not be permitted. Maximum size of coarse aggregate shall be as specified herein.
2. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33
3. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.
4. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.
5. When tested for soundness in accordance with ASTM C 88, the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.
6. When tested in accordance with "Potential Reactivity of Aggregates (Chemical Method)" (ASTM C 289), the ratio of silica released to reduction in alkalinity shall not exceed 1.0.
7. When tested in accordance with "Organic Impurities in Sands for Concrete" (ASTM C 40), the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.
8. When tested in accordance with "Resistance to Abrasion of Small size Coarse Aggregate by Use of the Los Angeles Machine" (ASTM C 131), the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.
9. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed

I. Admixtures

1. Air-entraining Admixture shall be added to all concrete unless noted otherwise. Air-entraining admixture meeting the requirements of ASTM C 260 shall be used. The ENGINEER reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

2. Water reducing and retarding admixtures shall be required at the ENGINEER's discretion or, if not required, may be added at the CONTRACTOR's option to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at no additional cost to the OWNER. The use of an admixture shall be subject to acceptance by the ENGINEER. Admixtures permitted shall conform to the requirements of ASTM C 494 (chemical admixtures). Admixtures shall contain no free chloride ions, be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air entraining admixture.

2.03 CURING MATERIALS

- A. Materials for curing concrete conform to ASTM C 309 Type 1-D, Class B with a minimum solids content of 30% and shall contain a fugitive dye. Curing compound shall be SureCure 30 by Kaufman Products, Inc., CA D.O.T. Acrylic Cure by Symons Corporation, Sealtight CS-309-30 by W. R. Meadows, or approved equal.
- B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of 6 mils.

2.04 JOINT MATERIALS

- A. Materials for joints in concrete above grade nonhydraulic structures shall conform to the following requirements:
 1. Preformed joint filler shall be a non-extruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.
 2. Joint sealer shall be in accordance to Section 07 90 00 – Sealants and Caulking.

2.05 REINFORCING STEEL

- A. General: All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:
 1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement, and shall be manufactured in the United States. All reinforcing steel shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on the Drawings
 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings; provided, that welded wire fabric with longitudinal wire of W9.5 size wire shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded

wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only. All welded wire fabric reinforcement shall be galvanized.

- B. Field welding of reinforcing steel will not be allowed
- C. Accessories: Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).
- D. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

2.06 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.
- B. All holes shall be drilled in accordance with the manufacturer's instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer's requirements.
- C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer's instructions prior to installation of adhesive and reinforcing bar.
- D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.
- E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer's instructions.
- F. Embedment Depth:
 - 1. The embedment depth of the bar shall be as show on the Drawings. Although all manufacturers listed below are permitted, the embedment depth shown on the Drawings is based on "SET-XP" by Simpson Strong-Tie Co. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.
 3. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.
- G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.
- H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete, must comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report. The adhesive system shall be "Epcon System C6+ Adhesive Anchoring System" as manufactured by ITW Redhead, " HIT-HY 200 Injection Adhesive Anchor System" as manufactured by Hilti, Inc. "SET-XP" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable.
- I. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

2.07 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall conform to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

2.08 GROUT

- A. Cement Grout
1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one-part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength

requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

2. The minimum compressive strength at 28 days shall be 4000 psi.
3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.
4. Sand shall conform to the requirements of ASTM C33.

B. Non-Shrink Grout

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28-day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, "Conspec 100 Non-Shrink Non-Metallic Grout" by Conspec, "MasterFlow 928" by BASF Corporation.

C. Epoxy Grout

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, "MasterEmaco ADH 1090 RS" by BASF Corporation.
2. Epoxy grout shall be modified as required for each application with aggregate per manufacturer's instructions.

D. Epoxy Base Plate Grout

1. Epoxy base plate grout shall be "Sikadur 42, Grout-Pak" by Sika Corporation, or "MasterFlow 648" by BASF Corporation.

2.09 CONCRETE DESIGN REQUIREMENTS

- A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed.

Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

- B. The CONTRACTOR is cautioned that the limiting parameters specified below are not design mixes. Additional cement or water reducing agent may be required to achieve workability demanded by the CONTRACTOR's construction methods. The CONTRACTOR is responsible for any costs associated with furnishing concrete with the required workability. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)

Concrete Class A	4,000 psi (minimum)
Concrete Class B	3,000 psi (minimum)

2. Water/cementitious materials ratio, by weight

	Maximum	Minimum
Concrete Class A	0.45	0.39
Concrete Class B	0.50	0.39

3. Slump range

- a. 4" nominal unless high range water reducing admixture is used
- b. 8" max if high range water reducing admixture is used.

4. Air Content

Concrete Class A	6% ±1.5%
Concrete Class B	3% Max (non air-entrained)

PART 3 – EXECUTION

3.01 GENERAL FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed and replaced at the CONTRACTOR's expense. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with the FBC, ACI 347 and the requirements specified herein.

- B. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

3.02 FORMWORK CONSTRUCTION

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for by the ENGINEER.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the ENGINEER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete.
- C. Form Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

3.03 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

3.04 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-day strength of the concrete as specified herein. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the ENGINEER.

3.05 FABRICATION OF REINFORCING STEEL

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the ENGINEER. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the ENGINEER.

3.06 PLACING REINFORCING STEEL

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Bars additional to those shown which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- E. Reinforcement placing tolerances shall be within the limits specified in ACI 318, unless otherwise directed by the ENGINEER.
- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown.
- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks

(dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.07 SPLICING

- A. Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the ENGINEER.
- B. Lap length for reinforcement bars shall be in a Class B Splice in accordance with ACI 318, unless otherwise shown. Laps of welded wire fabric shall be in accordance with the ACI 318.

3.08 CLEANING AND PROTECTION OF REINFORCING STEEL

- A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be reinspected and, if necessary, recleaned.

3.09 PREPARATION OF SURFACES FOR CONCRETING

- A. General: No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the ENGINEER. The CONTRACTOR shall notify the ENGINEER not less than two working days prior to concrete placement, allowing for inspection and any corrective measures which are required. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting, followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by hydroblasting. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provided that construction joints shall be made only where acceptable to the ENGINEER.
- E. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the ENGINEER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- G. Casting Against Old Concrete: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydro-blasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.
- H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the ENGINEER.
- I. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- J. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items, and any part of the concrete reinforcement will not be permitted.

- K. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.10 MIXING, HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.
- B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.
- D. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- E. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the OWNER. The CONTRACTOR shall notify the ENGINEER in writing at least 24 hours in advance of placement of any concrete.
- F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screened in an up-slope direction.
- G. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing, and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.

- H. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4 inch thick shall be tacked to the forms on these surfaces. The concrete shall be carded about 1/2 inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.
- I. Conveyor Belts and Chutes: All end of chutes, hopper gates and all other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete, at the places of deposit, is visible from the deck or runway.
- J. Temperature of Concrete: The temperature of concrete, when it is being placed, shall not be more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in whether during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessarily to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

3.11 PUMPING OF CONCRETE

- A. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. The minimum diameter of the hose (conduits) shall be 4 inches.
- C. Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand shall not be over 3.00.

3.12 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 or 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.13 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. Formed Surfaces: After removal of forms, the finishes described below shall be applied in accordance with Article 3.13, D. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The ENGINEER shall be the sole judge of acceptability of all concrete finish work.
 - 1. Type I - Rough: All fins, burrs and other projections left by the forms shall be removed. All holes left by removal of ends of ties, and all other holes, depressions, or voids shall be filled solid with cement grout after first being thoroughly wetted. Honeycombs shall be chipped back to solid concrete as directed, prior to patching with cement grout. Holes shall be filled with a small tool that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface. At locations where concrete coatings are specified to be applied, epoxy based patch material or filler surfaces compatible with the coating

shall be used in lieu of cement grout specified herein. Concrete finish shall be in strict conformance to the coating / paint manufacturer's recommendations.

2. Type II - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Any surplus shall be removed by scraping and then rubbing with clean burlap. The finish shall be kept damp for at least 36 hours after application.
 3. Type III - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type I finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted.
- C. Unformed Surfaces: The finishes described below shall be applied to unformed surfaces such as floors, slabs, flow channels and top of walls in accordance with Article 3.05 - Concrete Finish Schedule. The ENGINEER shall be the sole judge of acceptability of all such finish work.
1. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be applied, the surface of the screeded concrete shall be roughened with a concrete rake to 1/2" minimum deep grooves prior to final set.
 2. Type "B" - Wood Floated: This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood float until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. The finished surface shall be true, even, and free from blemishes and other irregularities.
 3. Type "C" - Cork Floated: This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.
 4. Type "D" - Steel Troweled: This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine

material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. In areas, which are to receive a floor covering such as tile, resilient flooring, or carpeting, only one troweling operation is required. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.

5. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish.
6. Type "F" - Swept in Grout Topping: This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03315 shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the CONTRACTOR shall notify the ENGINEER and the equipment manufacturer of the details of the operation and obtain approval and recommendations of the equipment manufacturer.
7. Type "G" - Hardened Finish: Either a liquid hardened finish or an aggregate hardened finish shall be provided at the CONTRACTOR's option.
 - a. Liquid hardened finish shall be provided by application of a liquid floor hardener. Floors to receive this finish shall have previously received a Type "D" finish. Liquid hardener shall be applied between 30 to 60 days after concrete placement. Surface to be treated shall be dry, clean and free of all loose dust, dirt, oil, wax, sealers and curing compounds. Application procedure shall be in accordance with manufacturer's instructions and shall consist of a three-coat treatment.
 - b. Aggregate hardened finish shall be provided by applying an aggregate floor hardener concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.
8. Type "H" - Non-Slip Finish: This finish shall be provided by applying a non-slip shake-on aggregate concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.
9. Type "J" - Raked Finish: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of +/-1/4-inch.

D. CONCRETE FINISH SCHEDULE

Item	Type of Finish
Exterior concrete walls below grade	I
Exterior exposed concrete walls and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere	II
All interior exposed concrete vertical surfaces in buildings	III
Interior exposed ceiling, including beams	III
Slabs to receive roofing material or waterproof membranes	B
All interior finish floors of buildings and structures and walking surfaces which will be continuously or intermittently wet	C
All interior finish floors of buildings and structures which are not continuously or intermittently wet	D
Floors to receive tile, resilient flooring, or carpeting	D
Exterior concrete sidewalks, steps, ramps, decks, slabs on grade and landings exposed to weather	E
Precast concrete form panels, hollow core planks, double tees	J

3.14 CURING AND DAMPPROOFING

- A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following paragraphs.

FINISH SCHEDULE

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
Unstripped forms	1
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	4

- B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 4.
- C. Method 2: The surface shall be covered With burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been

placed. No curing compound shall be applied to surfaces cured under Method 2.

- D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.
- E. Method 4: The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturers printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.
- F. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
- G. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by hydroblasting just prior to the placing of new concrete.
- H. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sand blasted to remove the curing compound, following which repairs shall be made as provided herein.

3.15 PROTECTION

- A. The CONTRACTOR shall protect all concrete against injury until final acceptance by the ENGINEER. Fresh concrete shall be protected from damage due to rain. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.16 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive

voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.

- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. The material used for repair proposed shall be acceptable to the ENGINEER.
- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed, but shall be repaired in an approved manner with dry-packed cement grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.17 CARE AND REPAIR OF CONCRETE

- A. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the OWNER. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR's expense. This stipulation includes concrete experiencing cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the ENGINEER. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the ENGINEER, unless other means or repair are deemed necessary and approved by the ENGINEER.

3.18 GROUT INSTALLATION

- A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.

- B. The CONTRACTOR through the manufacturer of non-shrink grout, epoxy grout, and epoxy base plate grout shall provide on-site technical assistance upon request, at no additional cost to the OWNER.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION

SECTION 05 05 23
METAL FASTENING

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide all metal welds and fasteners not otherwise specified, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05 10 00 – Metal Materials

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. AC 193 – Acceptance Criteria for Mechanical Anchors in Concrete Elements
2. AC 308 – Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
3. ACI 318 – Building Code Requirements for Structural Concrete
4. ACI 355.2 – Qualifications of Post-Installed Mechanical Anchors in Concrete
5. ACI 355.4 – Qualifications of Post-Installed Adhesive Anchors in Concrete
6. AISC – RCSC Specification for Structural Joints Using High Strength Bolts
7. AISC – Code of Standard Practice

8. AWS D1.1 – Structural Welding Code – Steel
9. AWS D1.2 – Structural Welding Code – Aluminum
10. AWS D1.6 – Structural Welding Code – Stainless Steel
11. Aluminum Association – Specifications for Aluminum Structures

12. ASTM A572/A572M-94C – Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel Grade 50
13. ASTM A36 – Standard Specification for Carbon Structural Steel
14. ASTM A489 – Standard Specification for Eyebolts
15. ASTM A563 – Standard Specifications for Carbon and Alloy Steel Nuts
16. ASTM D1785 – Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe
17. ASTM E3121 – Standard Test Methods for Field Testing of Anchors in Concrete or Masonry
18. ASTM F436 – Standard Specification for Hardened Steel Washers
19. ASTM F467 – Standard Specification for Nonferrous Nuts for General Use
20. ASTM F593 – Standard Specification for Stainless Steel Bolts; Hex Cap Screws, and Studs
21. ASTM F594 – Standard Specification for Stainless Steel Nuts
22. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
23. ASTM F3125 – Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength, Inch and Metric Dimension

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.
 1. Shop Drawings providing the fastener's manufacturer and type and certification of the fastener's material and capacity.
 2. Anchor design calculations sealed by a Professional Engineer currently registered in the State or Commonwealth in which the project is located.
 3. A current Evaluation Report shall be submitted for all anchors that will be considered for use on this project.
 4. Manufacturer's installation instructions.
 5. Copy of valid certification for each person who is to perform field welding.
 6. Certified weld inspection reports, when required.

7. Welding procedures.
8. Installer qualifications.
9. Certification of Installer Training.
10. Inspection Reports.
11. Results of Anchor Proof Testing.
12. Manufacturer's Literature for Resistance of Adhesive to Appropriate Chemical Exposure, where deemed necessary.

1.05 QUALITY ASSURANCE

- A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project.
- B. Evaluation Report: A current Evaluation Report from an independent testing and evaluation agency (ITEA) shall be submitted for all anchors that will be used on this project. The ITEA producing the evaluation report shall be accredited in accordance with the requirements for ITEA's in ACI 355.2 (for mechanical anchors) or 355.4 (for adhesive anchors). Acceptable ITEA's include but are not necessarily limited to the International Code Council Evaluation Service (ICC-ES) and the International Association of Plumbing and Mechanical Officials Uniform Evaluation Service (IAPMO-UES).
- C. Installer Qualifications: All concrete anchors shall be installed by an Installer with at least three years of experience performing similar installations. Concrete adhesive anchor installers for anchor installations in horizontal to vertically overhead applications shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.
- D. Installer Training: For concrete anchors, conduct a thorough training with the manufacturer or the manufacturer's representative for the Installer on the project. Training shall consist of a review of the complete installation process to include but not be limited to the following:
 1. Hole drilling procedure.
 2. Hole preparation and cleaning technique.
 3. Adhesive injection technique and dispenser training/maintenance.
 4. Concrete adhesive anchor preparation and installation.
 5. Proof loading/torquing.

- E. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All aluminum welding shall be performed by welders certified in accordance with AWS D1.2. All stainless-steel welding shall be performed by welders certified in accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.
- F. Welds and high strength bolts used in connections of structural steel will be visually inspected in accordance with Article 3.04.
- G. The Owner may engage an independent testing agency to perform testing of welded connections and to prepare test reports in accordance with AWS. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer and/or an acceptable independent testing laboratory, at no additional cost to the Owner.
- H. Provide a welding procedure for each type and thickness of weld. For welds that are not prequalified, include a Performance Qualification Report. The welding procedure shall be given to each welder performing the weld. The welding procedure shall follow the format in Annex E of AWS D1.1 with relevant information presented.
- I. Special inspections for concrete adhesive anchors shall be conducted in accordance with the Building Department with jurisdiction. The Contractor shall be responsible for retaining and paying for all special inspection costs.

PART 2 – PRODUCTS

2.01 ANCHOR RODS

- A. Anchor rods shall conform to ASTM F1554 Grade 55 except where stainless steel or other approved anchor rods are shown on the Drawings or stated herein. Anchor rods shall have hexagonal heads and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A. Washers shall meet the requirements of ASTM A436.
- B. All anchors into concrete shall be cast-in-place anchors unless specifically referenced otherwise on Drawings.
- C. Where anchor rods are used to anchor galvanized steel or are otherwise specified to be galvanized, anchor rods and nuts shall be hot dipped galvanized in accordance with ASTM F1554.
- D. Where pipe sleeves around anchor rods are shown on the Drawings, pipe sleeves shall be cut from Schedule 40 PVC plastic piping meeting the requirements of ASTM D1785.

2.02 HIGH STRENGTH BOLTS

- A. High strength bolts and associated nuts and washers shall be in accordance with ASTM F3125, Grade A325 Type 1 or Grade F1852 Type 1. Bolts, nuts, and washers shall meet the requirements of RCSC “Specification for Structural Joints Using High Strength Bolts”.
- B. Where high strength bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot dipped galvanized in accordance with ASTM A325.

2.03 STAINLESS STEEL BOLTS

- A. Stainless steel bolts shall conform to ASTM F-593 for alloy groups 1 and 2, Condition CW1, or ASTM F-3125. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless-steel members not subject to the above conditions shall be Type 304 stainless steel unless otherwise noted.
- B. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer and shall be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts, washers, and lock washers shall be of the same alloy as the bolts.

2.04 CONCRETE ANCHORS

- A. General
 - 1. Where concrete anchors are called for on the Drawings, one of the types listed below shall be used; except, where one of the types listed below is specifically called for on the Drawings, only that type shall be used. If no specific type is indicated on the Drawings, the concrete anchor shall be a cast-in-place anchor. The determination of anchors equivalent to those listed below shall be based on test data performed by an approved independent testing laboratory. Two types of anchors shall be used:
 - a. Mechanical anchors include any of the following anchors:
 - 1) Expansion anchors shall be mechanical anchors of the wedge, sleeve, or drop-in type that are set by expanding against the sides of the drilled hole.
 - 2) Screw anchors are mechanical anchors that derive tensile holding strength by the mechanical interlock provided by threads cutting into the concrete during installation. Screw anchors shall be one-piece, heavy duty screw anchors with a finished head.

- b. Adhesive anchors shall consist of threaded rods or bolts anchored with an adhesive system into hardened concrete. Adhesive anchors shall be two-part injection type using the manufacturer's static mixing nozzle and shall be supplied as an entire system.
2. Adhesive anchors shall conform to the requirements of ACI 355.4 or alternately to AC 308. Mechanical anchors shall conform to the requirements of ACI 355.2 or alternately to AC 193. Anchors in Seismic Design Categories C through F shall conform to the International Building Code and ACI 318 Appendix D requirements as applicable, including seismic test requirements.
3. Fire Resistance: All anchors installed within fire resistant construction shall either be enclosed in a fire-resistant envelope, be protected by approved fire-resistive materials, be used to resist wind and earthquake loads only, or anchor non-structural elements.
4. Engineer's approval is required for use of concrete anchors in locations other than those shown on the Drawings.

B. Wedge Anchors:

- a. Do not use when subjected to vibration.
- b. Do not use in exterior locations or locations subjected to freezing.
- c. Do not use in submerged, intermittently submerged, or buried locations.
- d. Suitable for use in overhead applications.

C. Screw Anchors:

- a. Do not use when subjected to vibration.
- b. Do not use in exterior locations or locations subjected to freezing.
- c. Do not use in submerged, intermittently submerged, or buried locations.
- d. Do not use in overhead applications.

D. Sleeve Anchors:

- a. Do not use when subjected to vibration.
- b. Do not use in exterior locations or locations subjected to freezing.
- c. Do not use in submerged, intermittently submerged, or buried locations.
- d. Suitable for use in overhead applications.

E. Undercut Anchors:

- a. Suitable for use where subjected to vibration.
- b. Do not use in exterior locations or locations subjected to freezing.
- c. Do not use in submerged, intermittently submerged, or buried locations.
- d. Suitable for use in overhead applications.

F. Adhesive Anchors in Concrete:

- a. Suitable for use where subjected to vibration.
- b. Suitable for use in exterior locations or locations subjected to freezing.
- c. Suitable for use in submerged, intermittently submerged, or buried locations.
- d. Do not use in overhead applications, unless otherwise shown or approved by Engineer.
- e. Suitable for use in chemical areas provided manufacturer's literature confirms appropriate chemical resistance.
- f. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.

G. Adhesive Anchors in Masonry

- a. Suitable for use where subjected to vibration.
- b. Suitable for use in exterior locations or locations subjected to freezing.
- c. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.
- d. Suitable for use in precast hollow core planks.

H. Concrete Anchor Design:

- 1. Basis of design shall include the following design parameters:
 - a. Cracked concrete conditions.
 - b. Dry or water saturated installation conditions.
 - c. Base material temperature between 40- and 104-degrees Fahrenheit.

- d. Installation with hammer drill or hollow-drill bit system drilling methods.
 - e. Installation not prior to 21-day minimum age of concrete.
2. An anchor design consists of specifying anchor size, quantity, spacing, edge distance and embedment to resist all applicable loads. Where an anchor design is indicated on the Drawings, the anchors shall be installed to the prescribed size, spacing, embedment depth, and edge distance. If all parts of an anchor design are provided on the Drawings except embedment depth, the Contractor shall provide the embedment depth as indicated in Paragraph B.3 unless otherwise directed by the Engineer. Where an anchor design is not indicated on the Drawings, the Contractor shall provide the anchor design per the requirements listed below.
- a. The Contractor shall submit design with signed and sealed calculations and drawings performed by an Engineer currently registered in the State or Commonwealth in which the project is located. Anchors shall be of a type recommended by the anchor manufacturer for use in cracked concrete and shall be designed by the Contractor in accordance with ACI 318 Appendix D.
 - b. Embedment Depth
 - 1) Minimum anchor embedment shall be designed by Contractor.
 - 2) Concrete anchors shall be embedded no less than the manufacturer's standard embedment (expansion or mechanical anchors) or to provide a minimum allowable bond strength equal to the allowable yield capacity of the rod according to the manufacturer (adhesive anchors).
 - 3) The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long-term temperature of 110 degrees F, and maximum short-term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum or more than the maximum stated in the manufacturer's literature.

I. Anchors:

1. Mechanical Anchors:

- a. Wedge Anchors: Wedge anchors shall be "Kwik Bolt TZ" by Hilti, Inc., "Strong-Bolt 2" by Simpson Strong-Tie Co. or "Power-Stud+SD1" or "Power-Stud+ SD-2" by DeWalt.
- b. Screw Anchors: Screw anchors shall be "KWIK HUS-EZ", "KWIK HUS-EZ-I", or "KWIK HUS-EZ CRC" by Hilti, Inc., "Titen HD" or "Stainless Steel Titen HD" by Simpson Strong-Tie Co., or "Screw-Bolt+" by DeWalt.

- c. Sleeve Anchors: Sleeve anchors shall be “HSL-3 Heavy Duty Sleeve Anchor” by Hilti, Inc. or “Power-Bolt +” by DeWalt.
 - d. Shallow Embedment Internally Threaded Insert (3/4” max embedment): “Mini-Undercut +Anchor” by DeWalt, “HDI-P-TZ” by Hilti, Inc. or approved equal.
 - e. Concrete Undercut Anchors: Concrete undercut anchors shall be “HDA Undercut Anchors” by Hilti, Inc, “DUC Ductile Undercut Anchor”, by USP Structural Connectors, or approved equal.
 - f. Mechanical anchor systems shall comply with ACI 355.2 or alternatively the latest revision of AC 193 and shall have a valid evaluation report in accordance with the applicable building code.
2. Adhesive Anchors:
- a. Adhesive anchors shall be “HIT HY-200 Adhesive Anchoring System” by Hilti, Inc., “SET-3G Epoxy Adhesive Anchors” by Simpson Strong-Tie Co., or “Pure 110+ Epoxy Adhesive Anchor System” by DeWalt.
 - b. Adhesive anchor systems shall be IBC compliant and capable of resisting short term wind and seismic loads (Seismic Design Categories A through F) as well as long term and short term sustained static loads in both cracked and uncracked concrete in all Seismic Design Categories. Adhesive anchor systems shall comply with ACI 355.4 or alternatively the latest revision of AC308 and shall have a valid evaluation report in accordance with the applicable building code. **No or equal products will be considered unless prequalified and approved by the Engineer and Owner.**

J. Concrete Anchor Materials:

- 1. Concrete anchors used to anchor structural steel shall be a threaded steel rod per manufacturer’s recommendations for proposed adhesive system but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, concrete anchors shall also be galvanized unless otherwise indicated on the Drawings.
- 2. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be manufactured from stainless steel unless noted otherwise. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless-steel members not subject to the above conditions shall be Type 304 stainless steel unless otherwise noted.

3. Nuts, washers, lock washers and other hardware shall be of a material to match the anchors.

2.05 MASONRY ANCHORS

- A. Anchors for fastening to solid or grout-filled masonry shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system. The adhesive system shall be "HIT HY-270 System" as manufactured by Hilti, Inc., "AC100+ Acrylic Adhesive" by DeWalt, or "SET-XP" as manufactured by Simpson Strong-Tie Co.
- B. Anchors for fastening to hollow masonry or brick shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system dispensed into a screen tube inserted into the masonry. The adhesive system shall use a two-component adhesive mix and shall inject into the screen tube with a static mixing nozzle. Thoroughly clean drill holes of all debris and drill dust prior to installation of adhesive and anchor. Contractor shall follow manufacturer's installation instructions. The adhesive system shall be "HIT HY-270 System" as manufactured by Hilti, Inc., "AC100+ Acrylic Adhesive" by DeWalt, or "SET-XP" as manufactured by Simpson Strong-Tie Co.
- C. Masonry anchors used to anchor steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, masonry anchors shall also be galvanized.
- D. Masonry anchors used to anchor aluminum, FRP, or stainless steel shall be manufactured from stainless steel unless noted otherwise. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless-steel members not subject to the above conditions shall be Type 304 stainless steel unless otherwise noted.
- E. Nuts, washers, lock washers and other hardware shall be of a material to match the anchors.
- F. Although all manufacturers listed are permitted, the masonry anchor design is based on "SET-XP by Simpson Strong-Tie ER 265 Revised 1-31-2017. If the contractor submits one of the other concrete adhesive anchors listed, the Engineer shall evaluate the proposed product and the Contractor shall provide the conditions stipulated by the Engineer specific to the approved adhesive anchor.

2.06 WELDS

- A. Electrodes for welding structural steel and all ferrous steel shall comply with AWS Code, using E70 series electrodes for shielded metal arc welding (SMAW), or F7 series electrodes for submerged arc welding (SAW).

- B. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.
- C. Electrodes for welding stainless steel and other metals shall comply with AWS D1.6.

2.07 WELDED STUD CONNECTORS

- A. Welded stud connectors shall conform to the requirements of AWS D1.1 Type C.

2.08 EYEBOLTS

- A. Eyebolts shall conform to ASTM A489 unless noted otherwise.

2.09 HASTELLOY FASTENERS

- A. Hastelloy fasteners and nuts shall be constructed of Hastelloy C-276. Hastelloy fasteners shall be used for fasteners located in chemical areas containing Hydrochloric Acid (Muriatic Acid), Hydrofluosilicic Acid (Fluoride), or Sulfuric Acid.

2.10 TITANIUM FASTENERS

- A. Titanium fasteners, washers, and nuts shall conform to ASTM B348, Grade 2. Titanium fasteners shall be used for fasteners located in chemical areas containing Ferric Chloride or Sodium Hypochlorite.

2.11 ANTISEIZE LUBRICANT

- A. Antiseize lubricant shall be C5-A Anti-Seize by Loctite Corporation, Molykote P-37 Anti-Seize Paste by Dow Corning, 3M Anti-Seize by 3M, or equal.

PART 3 – EXECUTION

3.01 MEASUREMENTS

- A. The Contractor shall verify all dimensions and review the Drawings and shall report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.02 FASTENER INSTALLATION

- A. Anchor Rods, Concrete Anchors, and Masonry Anchors
 1. Anchor rods shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template. Overhead adhesive anchors, and base plates or elements they are anchoring, shall be shored as required and securely held in place during anchor setting to prevent movement during anchor installation. Movement of anchors during curing is prohibited.

2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.
3. Concrete anchors shall not be used in place of anchor rods without Engineer's approval.
4. All stainless-steel threads shall be coated with anti-seize lubricant.

B. High Strength Bolts

1. All bolted connections for structural steel shall use high strength bolts. High strength bolts shall be installed in accordance with RCSC "Specification for Structural Joints Using High Strength Bolts". All bolted joints shall be Type N, snug-tight, bearing connections in accordance with AISC Specifications unless noted otherwise on the Drawings.

C. Stainless Steel Bolts

1. Where connections indicate the use of stainless-steel bolts, the bolts shall be installed to the snug tight condition. Connections shall include stainless steel washers under both the bolt head and the nut head. Lock washers shall be utilized for all connections and shall be placed under the nut head.

D. Concrete Anchors

1. Concrete at time of anchor installation shall be a minimum age of 21 days, have a minimum compressive strength of 2500 psi, and shall be at least 50 degrees F.
2. Concrete Anchor Testing:
 - a. At all locations, at least 10 percent of all concrete anchors installed shall be proof tested to 80% of the yield strength of the anchor rod, with a minimum of one tested anchor per anchor group.
 - b. Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested, load test values and proposed anchor testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. Proof testing of anchors shall be in accordance with ASTM E3121 for the static tension test. If additional tests are required, inclusion of these tests shall be as stipulated on Contract Drawings.
 - c. Where Contract Documents indicate anchor design to be the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested and load test values, sealed by a

Professional Engineer currently registered in the State or Commonwealth in which the project is located. Documentation shall also be submitted indicating the Contractor's proof testing procedures have been reviewed and the proposed procedures are acceptable. Proof testing procedures shall be in accordance with ASTM E3121.

- d. Concrete Anchors shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the anchor after loading shall be considered a failure. Anchors exhibiting damage shall be removed and replaced. If more than 5 percent of tested anchors fail, then 100 percent of anchors shall be proof tested.
 - e. Proof testing of concrete anchors shall be performed by an independent testing laboratory hired directly by the Contractor and approved by the Engineer. The Contractor shall be responsible for costs of all proof testing, including additional testing required due to previously failed tests.
3. All concrete anchors shall be installed in strict conformance with the manufacturer's printed installation instructions. A representative of the manufacturer shall be on site when required by the Engineer.
 4. All holes shall be drilled in accordance with the manufacturer's instructions except that cored holes shall not be allowed unless specifically approved by the Engineer. If cored holes are allowed, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with the manufacturer's instructions prior to installation of adhesive and threaded rod unless otherwise recommended by the manufacturer. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer. Injection of adhesive into the hole shall be performed to minimize the formation of air pockets in accordance with the manufacturer's instructions. Wipe rod free from oil that may be present from shipping or handling.
 5. All adhesive anchor installations in the horizontal to vertically overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI per ACI 318-11 D.9.2.2. Current AAI Certificate must be submitted to the Engineer of Record prior to commencement of any adhesive anchor installations.

E. Other Bolts

1. All dissimilar metal shall be connected with appropriate fasteners and shall be isolated via an approved dielectric.
2. All stainless-steel bolts shall be coated with anti-seize lubricant.

3.03 WELDING

- A. All welding shall comply with AWS Code for procedures, appearance, quality of welds, qualifications of welders and methods used in correcting welded work.
- B. Welded stud connectors shall be installed in accordance with AWS D1.1.
- C. Welds shown on the Drawings with a field weld symbol shall be field welded. All other welds shall be shop welded unless specifically approved by the Engineer.

3.04 INSPECTION

- A. High strength bolting will be visually inspected in accordance with RCSC "Specification for Structural Joints Using High Strength Bolts". Rejected bolts shall be either replaced or retightened as required.
- B. Field welds will be visually inspected in accordance with AWS Codes. Inadequate welds shall be corrected or redone as required in accordance with AWS Codes.
- C. Post-installed concrete anchors shall be inspected as required by ACI 318.

3.05 CUTTING OF EMBEDDED REBAR

- A. The Contractor shall not cut embedded rebar cast into structural concrete during installation of post-installed fasteners without prior approval of the Engineer.

END OF SECTION

SECTION 09 90 00
PAINTING

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and Specified herein.

- B. Section Includes:
 - 1. Paint Materials
 - 2. Shop Painting
 - 3. Field Painting
 - a. Surface Preparation
 - b. Piping and Equipment Identification
 - c. Schedule of Colors
 - d. Work in Confined Spaces
 - e. OSHA Safety Colors

1.02 RELATED SECTIONS

- A. Not used

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of these specifications, the Work shall conform to the applicable requirements of the following documents:
 - 1. SSPC – The Society for Protective Coatings Standards
 - a. SSPC-Vis 1 – Pictorial Surface Preparation Standards for Painting Steel Structures
 - b. SSPC-SP2 – Hand Tool Cleaning
 - c. SSPC-SP3 – Power Tool Cleaning

- d. SSPC-SP5/NACE 1 – White Metal Blast Cleaning
 - e. SSPC-SP6/NACE 3 – Commercial Blast Cleaning
 - f. SSPC-SP7/NACE 4 – Brush-off Blast Cleaning
 - g. SSPC-SP10/NACE 2 – Near-White Metal Blast
 - h. SSPC-SP11 – Power Tool Cleaning to Bare Metal
 - i. SSPC-SP13/NACE6 – Surface Preparation of Concrete
2. ICRI – International Concrete Repair Institute
 3. NACE – National Association of Corrosion Engineers
 4. NAFB – The National Association of Pipe Fabricators
 5. ASTM D1737 – Test Method for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus
 6. ASTM B117 – Method of Salt Spray (Fog) Testing
 7. ASTM D4060 – Test Method for Abrasion Resistance of Organic Coating by the Taber Abraser
 8. ASTM D3359 – Method for Measuring Adhesion by Tape Test

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, submit the following:
 1. Manufacturer's literature and Material Safety Data Sheets for each product.
 2. Painting schedule identifying surface preparation and paint systems proposed. Cross reference with Tables 1 and 2. Provide the name of the paint manufacturer, and name, address, and telephone number of manufacturer's representative who will inspect the work. Submit schedule for approval as soon as possible following the Award of Contract, so approved schedule may be used to identify colors and specify shop paint systems for fabricated items. Manufacturer shall substitute paint system with equal performance where required for VOC compliance.
 3. Contractor shall submit Q.C. Inspection plan describing all tests and inspections task to be performed. Include copy of daily log showing environmental conditions measurements and frequency. Copy of completed log shall be provided at completion of work.

1.05 SYSTEM DESCRIPTION

- A. Work shall include surface preparation, paint application, inspection of painted surfaces and corrective action required, protection of adjacent surfaces, cleanup and appurtenant work required for the proper painting of all surfaces to be painted. Surfaces to be painted are designated within the Painting Schedule and may include new and existing piping, miscellaneous metals, equipment, buildings, exterior fiberglass, exposed electrical conduit and appurtenances.
- B. Perform Work in strict accordance with manufacturer's published recommendations and instructions, unless the Engineer stipulates that deviations will be for the benefit of the project.
- C. Paint surfaces which are customarily painted, whether indicated to be painted or not, with painting system applied to similar surfaces, areas and environments, and as approved by Engineer.
- D. Piping and equipment shall receive color coding and identification. Equipment shall be the same color as the piping system.

1.06 QUALITY ASSURANCE

- A. Painting operations shall be accomplished by skilled craftsman and licensed by the state/commonwealth to perform painting work.
- B. Provide a letter indicating that the painting applicator has five years of experience, and 5 references which show previously successful application of the specified or comparable painting systems. Include the name, address, and the telephone number for the Owner of each installation for which the painting applicator provided services.
- C. Contractor shall coordinate Q.C Inspections.
- D. Notify Owner and Engineer at completion of surface preparation, priming application and final cure to allow inspection by Owner and Engineer or their Third-Party Inspector.

1.07 STORAGE AND DELIVERY

- A. Bring materials to the job site in the original sealed and labeled containers.
- B. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

PART 2 – MATERIALS

2.01 GENERAL INFORMATION

- A. The term "paint" is defined as both paints and coatings including emulsions, enamels, stains, varnishes, sealers, and other coatings whether organic or inorganic and whether used as prime, intermediate, or finish coats.
- B. Purchase paint from an approved manufacturer. Manufacturer shall assign a representative to inspect application of their product both in the shop and field. The manufacturer's representative shall submit a report to the Engineer at the completion the Work identifying products used and verifying that surfaces were properly prepared, products were properly applied, and the paint systems were proper for the exposure and service.
- C. Provide primers and intermediate coats produced by same manufacturer as finish coat. Use only thinners approved by paint manufacturer, and only within manufacturer's recommended limits.
- D. Ensure compatibility of total paint system for each substrate. Test shop primed equipment delivered to the site for compatibility with final paint system. Provide an acceptable barrier coat or totally remove shop applied paint system when incompatible with system specified, and repaint with specified paint system.
- E. Use painting materials suitable for the intended use and recommended by paint manufacturer for the intended use.
- F. Require that personnel perform work in strict accordance with the latest requirements of OSHA Safety and Health Standards for construction. Meet or exceed requirements of regulatory agencies having jurisdiction and the manufacturer's published instructions and recommendations. Maintain a copy of all Material Safety Data Sheets at the job site of each product being used prior to commencement of work. Provide and require that personnel use protective and safety equipment in or about the project site. Provide respiratory devices, eye and face protection, ventilation, ear protection, illumination and other safety devices required to provide a safe work environment.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Specifications, provide products from one of the following manufacturers:
 - 1. Tnemec Company Inc.
 - 2. PPG
 - 3. CARBOLINE

4. Sherwin-Williams
5. International Paints (Akzo Nobel)

PART 3 – EXECUTION

3.01 SHOP PAINTING

- A. Shop prime fabricated steel and equipment with at least one shop coat of prime paint compatible with finish paint system specified. Prepare surface to be shop painted in strict accordance with paint manufacturer's recommendations and as specified. Finish coats may be shop applied, if approved by the Engineer. Package, store and protect shop painted items until they are incorporated into Work. Repair painted surfaces damaged during handling, transporting, storage, or installation to provide a painting system equal to the original painting received at the shop.
- B. Identify surface preparation and shop paints on Shop Drawings. Verify compatibility with field applied paints.
- C. Coordinate shop painting and field coating to ensure item is delivered and field coating occurs within recoat window of shop painted system requirements.

3.02 SURFACE PREPARATION

- A. General
 1. Surfaces to be painted shall be clean and dry, and free of dust, rust, scale, and foreign matter. No solvent cleaning, power or hand tool cleaning shall be permitted unless approved by the Engineer.
 2. Protect or remove, during painting operations, hardware, accessories, machined surfaces, nameplates, lighting fixtures, and similar items not intended to be painted prior to cleaning and painting. Reposition items removed upon completion of painting operations.
 3. Examine surfaces to be coated to determine that surfaces are suitable for specified surface preparation and painting. Report to Engineer surfaces found to be unsuitable in writing. Do not start surface preparation until unsuitable surfaces have been corrected. Starting surface preparation precludes subsequent claim that such surfaces were unsuitable for the specified surface preparation or painting.
 4. Surface preparation shall be in accordance with specifications and manufacturer's recommendations. Provide additional surface preparation, and fill coats where manufacturer recommends additional surface preparation, in addition to requirements of specification.

5. Touch-up shop or field applied coatings damaged by surface preparation or any other activity, with the same shop or field applied coating; even to the extent of applying an entire coat when required to correct damage prior to application of the next coating. Touchup coats are in addition to the specified applied systems, and not considered a field coat.
6. Protect motors and other equipment during blasting operation to ensure blasting material is not blown into motors or other equipment. Inspect motors and other equipment after blasting operations and certify that no damage occurred, or where damage occurred, the proper remedial action was taken.
7. Field paint shop painted equipment in compliance with Color Coding and as approved by Engineer.

B. Metal Surface Preparation

1. Prepare all welds to a minimum NACE weld preparation level "C" per NACE Standard SP0178. Provide additional weld preparation where required by the coating manufacturer. Contractor shall provide NACE SP0178 weld mold visual aids on site for evaluation of all weld preparation.
2. Conform to current The Society for Protective Coatings Standards (SSPC) Specifications for metal surface preparation. Use SSPC-Vis-1 pictorial standards or NACE visual standards TM-01-70 or TM-01-75 to determine cleanliness of abrasive blast cleaned steel.
3. Perform blast cleaning operations for metal when following conditions exist:
 - a. Moisture is not present on the surface.
 - b. Relative humidity is below 80%.
 - c. Ambient and surface temperatures are 5°F or greater than the dew point temperature.
 - d. Painting or drying of paint is not being performed in the area.
 - e. Equipment is in good operating condition.
 - f. Proper ventilation, illumination, and other safety procedures and equipment are being provided and followed.
4. Abrasive blast ferrous metals to be shop primed, or component mechanical equipment in accordance with SSPC-SP5, White Metal Blast.

5. Abrasive blast field prepared ferrous metals in accordance with SSPC-SP10, Near White Metal Blast, where metal is to be submerged, in a corrosive environment, or in severe service. Provide a 3.0 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
6. Abrasive blast field prepared ferrous metals in accordance with SSPC-SP6 Commercial Blast, where metal is to be used in mild or moderate service, or non-corrosive environment or weathering exposure. Provide a 1.5 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
7. Clean nonferrous metals, copper, or galvanized metal surfaces in accordance to SSPC-SP1, Solvent Cleaning, or give one coat of metal passivator or metal conditioner compatible with the complete paint system. Galvanized metal shall be prepared in accordance with SSPC SP-16. Abrasive blast clean to increase mechanical adhesion in accordance with ASTM D6386, Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting when required by coating manufacturer. Provide a 1.5 mil minimum angular anchor profile unless recommended otherwise by the coating manufacturer in writing.
8. Abrasive blast clean internal and external ductile iron pipe surfaces prior to coating in accordance with NAPF 500-03-04, Surface Preparations Standard for Abrasive Blast Cleaning of Ductile Iron Pipe. Abrasive blast clean internal and external cast ductile iron and cast-iron fitting surfaces in accordance with NAPF-03-05.
9. Prime cleaned metals immediately after cleaning to prevent rusting.
10. Clean rusted metals down to bright metal by abrasive blasting and immediately field primed.

C. Concrete Surface Preparation

1. Cure concrete a minimum of 28 days at 75° F before surface preparation, and painting begins. Allow more time at lower temperatures if specified by paint manufacturer.
2. Test concrete for pH and salts using test methods recommended by the paint manufacturer. A minimum of one test per 1000 square feet of area to be coated shall be performed unless approved otherwise by Engineer. Do not begin surface preparation, or painting until acceptable to manufacturer.
3. Moisture content of concrete and masonry surfaces shall conform to manufacturer's recommended limits, and as listed in SSPC-SP13/NACE 6 Section 6 Acceptance Criteria Table 1. Floor surfaces to be coated shall be tested in

accordance with ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride or as required by the coating manufacturer. Moisture vapor transmission shall not exceed three pounds per 1,000 square feet in a 24-hour period or less if specified by Coating Manufacturer. Vertical and horizontal overhead surfaces shall be tested in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes (relative humidity shall not exceed 80% or as required by the coating manufacturer) or with ASTM D4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Test Method (test results shall be no moisture present). Engineer or Coating Manufacturer Representative shall specify all test locations. A minimum of one test per 1000 square feet of area to be coated shall be performed unless approved otherwise by Engineer.

4. Prepare concrete surfaces to receive coatings in accordance with NACE 6/SSPC-13 – Joint Surface Preparation Standards and ICRI Technical Guidelines. Remove contaminants, open bugholes, surface voids, air pockets, and other subsurface irregularities using abrasive blasting, shot blasting, water jetting or mechanical abrading. Use dry, oil-free air for blasting operations. Surface texture after blasting shall achieve profile as required by manufacturer or where not defined by manufacturer, profile shall be a minimum ICRI-CSP 5 surface profile. Remove residual abrasives, dust, and loose particles by vacuuming or other approved method.
5. Surface defects, such as hollow areas, bugholes, honeycombs, and voids shall be filled with polymeric or waterborne epoxy cementitious filler compatible with painting system. Complete fill coats may be used in addition to specified painting system and as approved by the Engineer. Fins, form marks, and all protrusions or rough edges shall be removed.
6. Repair existing concrete surfaces which are deteriorated to the point that surface preparation exposes aggregate with fill coats or patching mortar as recommended by paint manufacturer and as directed by the Engineer.
7. Clean concrete of all dust, form oils, curing compounds, oil, tar, laitance, efflorescence, loose mortar, and other foreign materials before paints are applied.
8. To ease coating around outside corners, provide ¾-inch chamfered edges on all new concrete outside corners and grind existing concrete outside corners to a minimum radius of ¾-inch.
9. Unless recommended otherwise by the coating manufacturer, provide ¼” deep by ¼” wide tool cut terminations at 1-inch maximum from all coating edges for anchorage. Provide terminations around all equipment, piping, openings, gates, top and bottom of walls, stop locations of each day’s work and overlap onto

previously completed work. Transition coating 3-inches onto interior lining of piping except where coating compatibility concerns are noted by coating manufacturer.

10. Apply epoxy or polymeric filler compatible with painting system to all inside corners of areas to be coated with a margin trowel to form a continuous 45-degree cant cove across corners with a minimum dimension of 1.5-inch. Roughen or prepare cured filler as recommended by coating manufacturer for proper coating adhesion.
11. All equipment grouting shall be installed and cured prior to starting coating work. Coating shall be applied over grout up to the edges of all equipment, gates and uninterrupted piping unless specifically noted otherwise.

D. Wood

1. Clean wood surfaces free of all foreign matter, with cracks and nail holes and other defects properly filled and smoothed. Remove sap and resin by scraping and wipe clean with rags dampened with mineral spirits.
2. Saturate end grain, cut wood, knots, and pitch pockets with an appropriate sealer before priming.
3. Prime and backprime wood trim before setting in place.
4. After prime coat has dried, fill nailholes, cracks, open joints, and other small holes with approved spackling putty. Lightly sand wood trim prior to applying second coat of paint.

E. Castings

1. Prepare castings for painting by applying a brush or a knife-applied filler. Fillers are not to be used to conceal cracks, gasholes, or excessive porosity.
2. Apply one coat of primer with a minimum thickness of 1.2 mils in addition to coats specified. Allow sufficient drying time before further handling.

F. Masonry

1. Cure for a minimum of 30 days prior to paint application.
2. Clean masonry surfaces free from all dust, dirt, oil, grease, loose mortar, chalky deposits, efflorescence, and other foreign materials.
3. Test masonry for moisture content. Use test method recommended by paint manufacturer. Do not begin painting until moisture content is acceptable to manufacturer.

G. Gypsum Drywall

1. Sand joint compound with sandpaper to provide a smooth flat surface. Avoid sanding of adjacent drywall paper.
2. Remove dust, dirt, and other contaminants.

H. Previously-Painted Surfaces

1. Totally remove existing paint when: surface is to be submerged in a severe environment, paint is less than 75% intact, brittle, eroded or has underfilm rusting.
2. Surfaces which are greater than 75% intact require removal of failed paints and then spot primed. Spot priming is in addition to coats specified.
3. Remove surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers.
4. Clean and dull glossy surfaces prior to painting in accordance with the manufacturer's recommendations.
5. Check existing paints for compatibility with new paint system. If incompatible, totally remove existing paint system or apply a barrier coat recommended by the paint manufacturer. Remove existing paints of undetermined origin. Prepare a test patch of approximately 3 square feet over existing paint. Allow test patch to dry thoroughly and test for adhesion. If proper adhesion is not achieved remove existing paint and repaint.

3.03 APPLICATION OF PAINT

- A. Apply paint by experienced painters with brushes or other applicators approved by the Engineer, and paint manufacturer.
- B. Apply paint without runs, sags, thin spots, or unacceptable marks.
- C. Apply at rate specified by the manufacturer to achieve at least the minimum dry mil thickness specified. Apply additional coats, if necessary, to obtain thickness.
- D. Special attention shall be given to nuts, bolts, edges, angles, flanges, welds, etc., where insufficient film thicknesses are likely. Stripe paint outside corners and edges in accordance with SSPC PA Guide 11. Stripe painting shall be in addition to coats specified.
- E. Perform thinning in strict accordance with the manufacturer's instructions, and with the full knowledge and approval of the Engineer and paint manufacturer.

- F. Allow paint to dry a minimum of twenty-four hours between application of any two coats of paint on a particular surface, unless shorter time periods are a requirement by the manufacturer. Longer drying times may be required for abnormal conditions as defined by the Engineer and paint manufacturer. Do not exceed manufacturer's recommended drying time between coats.
- G. Suspend painting when any of the following conditions exist:
 - 1. Rainy or excessively damp weather.
 - 2. Relative humidity exceeds 85%.
 - 3. General air temperature cannot be maintained at 50°F or above through the drying period, except on approval by the Engineer and paint manufacturer.
 - 4. Relative humidity will exceed 85% or air temperature will drop below 40°F within 18 hours after application of paint.
 - 5. Surface temperature of item is within 5 degrees of dewpoint.
 - 6. Dew or moisture condensation are anticipated.
 - 7. Surface temperature exceeds the manufacturer's recommendations.
- H. Where application of coating across concrete control joints or expansion joints has the potential to crack, turn coating into joints and caulk joints with a sealant compatible with coating rated for the intended service per Section 07 90 00 – Joint Fillers, Sealants, Caulking.

3.04 INSPECTION

- A. Each field coat of paint will be inspected and approved by the Engineer or his authorized representative before succeeding coat is applied. Tint successive coats so that no two coats for a given surface are exactly the same color. Tick-mark surfaces to receive black paint in white between coats.
- B. Use magnetic dry film thickness gauges and wet film thickness gauges for quality control. Furnish magnetic dry film thickness gauge for use by the Engineer.
- C. Coatings shall pass a holiday detector test.
- D. Determination of Film Thickness: Randomly selected areas, each of at least 107.5 contiguous square feet, totaling at least 5% of the entire control area shall be tested. Within this area, at least 5 squares, each of 7.75 square inches, shall be randomly selected. Three readings shall be taken in each square, from which the mean film thickness shall be calculated. No more than 20 percent of the mean film thickness

measurements shall be below the specified thickness. No single measurement shall be below 80 percent of the specified film thickness. Total dry film thickness greater than twice the specified film thickness shall not be acceptable. Areas where the measured dry film thickness exceeds twice that specified shall be completely redone unless otherwise approved by the Engineer. When measured dry film thickness is less than that specified additional coats shall be applied as required.

- E. Holiday Testing: Holiday test painted ferrous metal surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures. Mark areas which contain holidays. Repair or repaint in accordance with paint manufacturer's printed instructions and retest.
 - 1. Dry Film Thickness Exceeding 20 Mils: For surfaces having a total dry film thickness exceeding 20 mils: Pulse-type holiday detector such as Tinker & Razor Model AP-W, D.E. Stearns Co. Model 14/20, shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.
 - 2. Dry Film Thickness of 20 Mils or Less: For surfaces having a total dry film thickness of 20 mils or less: Tinker & Razor Model M1 non-destructive type holiday detector, K-D Bird Dog, shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flow, shall be added to the water prior to wetting the detector sponge.
- F. Paint manufacturer's NACE certified representative shall provide their services as required by the Engineer. Services shall include, but not be limited to, inspecting existing paint, determination of best means of surface preparation, inspection of completed work, and final inspection of painted work 11 months after the job is completed.

3.05 PROTECTION OF ADJACENT PAINT AND FINISHED SURFACES

- A. Use covers, masking tape, other method when protection is necessary, or requested by Owner or Engineer. Remove unwanted paint carefully without damage to finished paint or surface. If damage does occur, repair the entire surface adjacent to and including the damaged area without visible lapmarks and without additional cost to the Owner.
- B. Take all necessary precautions to contain dispersion of abrasive blasting debris and paint to the limits of the work. Take into account the effect of wind and other factors which may cause dispersion of the abrasive blasting debris and paint. Suspend painting operations when abrasive blasting debris or paint cannot be properly confined. Assume all responsibilities and cost associated with damage to adjacent structures, vehicles, or surfaces caused by the surface preparation and painting operations.

3.06 PIPING AND EQUIPMENT IDENTIFICATION

- A. Note Used

3.07 SCHEDULE OF COLORS

- A. Match colors indicated. Colors which are not indicated shall be selected from the manufacturer's full range of colors by the City. No variation shall be made in colors without the Engineer's approval. Color names and numbers shall be identified according to the appropriate color chart issued by the manufacturer of the particular product in question.

3.08 WORK IN CONFINED SPACES

- A. Provide and maintain safe working conditions for all employees. Supply fresh air continuously to confined spaces through the combined use of existing openings, forceddraft fans and temporary ducts to the outside, or direct air supply to individual workers. Exhaust paint fumes to the outside from the lowest level in the contained space. Provide explosionproof electrical fans, if in contact with fumes. No smoking or open fires will be permitted in, or near, confined spaces where painting is being done. Follow OSHA, state/commonwealth, and local regulations at all times.

3.09 OSHA SAFETY COLORS

- A. Paint wall around wall-mounted breathing or fire apparatus with the appropriate safety red color; area not to exceed 2 feet wide by 3 feet high, unless apparatus covers the area. Fire apparatus include fire hoses, extinguisher, and hydrants.
- B. Paint hazardous areas and objects in accordance with OSHA regulations.

3.10 VOC REGULATIONS

- A. Provide paint systems in accordance with local, state, and federal regulations. Where paint systems shown in schedule do not comply substitute equal products with VOC limits which comply with local, state, and federal regulations.

Table 1: Painting Schedule

Surface	Application	Painting System and No. of Coats	Product Reference (Table 2)	Total Min. Dry Film Thickness (Mils)
Concrete and Masonry				
Electrical Room of Electrical Building Nearby the Effluent Pump Station	See Structural Drawings	See Structural Drawings	See Structural Drawings	See Structural Drawings
Metals				
Interior and exterior nonsubmerged (gloss)	Motors, mechanical equipment, valves, pump discharge head, top of sole plate and piping.	1 coat epoxy polyamide primer	104	4-6
		1 coat epoxy polyamide	102	4-6
		1 coat aliphatic polyurethane	115	3-5
Interior insulated		1 coat acrylic latex	103	4
Submerged Wastewater or Treated Wastewater Effluent	Effluent Pump No. 3 pump bowl assembly, pump discharge column (interior and exterior) and underside of soleplate.	2 coats high solids epoxy	119	8-10/coat
Steel doors, windows and door frames, steel stairs, monorails, structural steel, misc. metals (steel), galvanized lintels,		1 coat epoxy polyamide	102	5-8
		1 coat aliphatic polyurethane	115	3-4
Aluminum surfaces in contact with concrete		2 coats coal tar	107	26
Shop Primed Structural Steel	Pre-Engineered Buildings	1 tie coat	113	2-3
		1 coat epoxy	114	3-4
		1 coat epoxy	120	3-4

Table 2: Product Listing

Ref.	System	Purpose	Product			
			Tnemec Series	PPG/AMERON	CARBOLINE	Sherwin-Williams
101	Acrylic filler	Primer-sealer	130-6601	BLOXFIL 4000	Sanitile 100	Cement-Plex 875
102	Epoxy polyamide	Finish coat semi-gloss or gloss	N69	AMERLOCK 2	Carboguard 890	Macropoxy 646
103	Acrylic latex	Sealer	1028/1029	PITT TECH PLUS	Carbocrylic 3359DTM	DTM Acrylic Primer/Finish
104	Epoxy Polyamide – metal	Primer	66	AMERCOAT 385	Carboguard 893SG	Macropoxy 646
105	Epoxy	Primer/Finish	N140	AMERLOCK 2	Carboguard 61/891VOC	Macropoxy 646 PW
106	Coal tar epoxy	Finish high-coat build	46H-413	AMERCOAT 78HB	Bitumastic 300M	Hi-Mil Sher Tar Epoxy
107	Coal tar	Sealer	46-465	AMERCOAT 78HB	Bitumastic 300M	Hi-Mil Sher Tar Epoxy
108	Alkyd-medium oil	Finish coat	2H	DEVGUARD 4308	Carbocoat 8215	Industrial Enamel
109	Alkyd-long oil	Finish coat	1029	DEVGUARD 4308	Carbocoat 8215	Industrial Enamel
110	Epoxy polyamide	Primer	66-1211	AMERCOAT 385	Carboguard 893SG	Macropoxy 646
112	Epoxy polyamide	Sealer	66-1211	AMERCOAT 385	Carboguard 893SG	Macropoxy 920 Pre-Prime
113	Urethane	Barrier coat	530	AMERLOCK SEALER	Rustbond	-
114	Polyamine Epoxy	Intermediate coat	27	AMERLOCK 385	Carboguard 893SG	-
115	Aliphatic Polyurethane	Finish coat	1094 or 1095	AMERCOAT 450 HS	Carbothane 134HG	Acrolon 218HS
116	Acrylic epoxy	Finish coat	113 or 114	AQUAPON WB	Sanitile 255	Water-Based Catalyzed Epoxy
117	Epoxy block filler	Sealer	1254	AMERLOCK 114	Sanitile 500	Kem Cati-Coat HS Epoxy Filler
118	Catalyzed epoxy	Finish coat	84	AMERLOCK 2/400	Carboguard 890	Macropoxy 646
119	High solids epoxy	Finish coat	104	AMERLOCK 400	Carboguard 890	Dura-Plate 235
120	Epoxy	Top coat	N69	AMERLOCK 2/400	Carboguard 890	-

END OF SECTION

SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for, or incidental, to the furnishing and installation of all electrical work as shown on the Drawings, and as specified in accordance with the provisions of the Contract Documents and completely coordinate with the work of other trades involved in the general construction. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation shall be furnished and installed as part of this work. The Contractor shall obtain approved Shop Drawings showing wiring diagrams, connection diagrams, roughing-in and hook up details for all equipment and comply therewith. All electrical work shall be complete and left in operating condition in accordance with the intent of the Drawings and the Specifications for the electrical work.
- B. Reference Process Control Riser Diagram for scope of work details as they relate to the pump control.
- C. The electrical scope of work for this project primarily includes, but is not limited to, the following:
 - 1. Furnish and install motor control equipment including reduced voltage motor starters and variable frequency drives.
 - 2. Furnish and install all aboveground raceway systems including conduit, fittings, boxes, supports, and other pertinent components.
 - 3. Furnish and install all wire and cable resulting in a complete and operable electrical system.
 - 4. Other electrical work as specified herein and indicated on the Drawings.
- D. All material and equipment must be the product of an established, reputable, and approved manufacturer; must be new and of first-class construction; must be designed and guaranteed to perform the service required; and must bear the label of approval of the Underwriters Laboratories, Inc., where such approval is available for the product of the listed manufacturer as approved by the Engineer.

- E. When a specified or indicated item has been superseded or is no longer available, the manufacturer's latest equivalent type or model of material or equipment as approved by the Engineer shall be furnished and installed at no additional cost to the Owner.
- F. Where the Contractor's selection of equipment of specified manufacturers or additionally approved manufacturers requires changes or additions to the system design, the Contractor shall be responsible in all respects for the modifications to all system designs, subject to approval of the Engineer. The Contractor's bid shall include all costs for all work of the Contract for all trades made necessary by such changes, additions or modifications or resulting from any approved substitution.
- G. Furnish and install all stands, racks, brackets, supports, and similar equipment required to properly serve the equipment which is furnished under this Contract, or equipment otherwise specified or indicated on the Drawings.
- H. All electrical components and systems, including electrical equipment foundations, shall be designed to resist operational forces as well as lateral sway and axial motion from hurricane winds.

1.02 EQUIPMENT LOCATION

- A. The Drawings show the general location of feeders, transformers, outlets, conduits, and circuit arrangements. Because of the small scale of the Drawings, it is not possible to indicate all of the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting the work and shall arrange such work accordingly; furnishing such fittings, junction boxes, and accessories as may be required to meet such conditions. The Contractor shall refer to the entire Drawing set to verify openings, special surfaces, and location of other equipment, or other special equipment prior to roughing-in for panels, switches, and other outlets. The Contractor shall verify all equipment dimensions to ensure that proposed equipment will fit properly in spaces indicated.
- B. Where outlets are shown near identified equipment furnished by this or other Contractors, it is the intent of the Specifications and Drawings that the outlet be located at the equipment to be served. The Contractor shall coordinate the location of these outlets to be near the final location of the equipment served whether placed correctly or incorrectly on the Drawings.

1.03 LOCAL CONDITIONS

- A. The Contractor shall examine the site and become familiar with conditions affecting the work. The Contractor shall investigate, determine, and verify locations of any overhead or buried utilities on or near the site, and shall determine such locations in conjunction with all public and/or private utility companies and with all authorities having jurisdiction.

All costs, both temporary and permanent to connect all utilities, shall be included in the Bid.

- B. The Contractor is responsible for coordinating all electric utility equipment installations with the serving electric utility. The Contractor shall furnish and install all electric utility equipment required by the electric utility to be installed by the Contractor whether specifically shown on the Drawings or not.

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures and the requirements of the individual Specification Sections, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Operation and Maintenance Manuals
 - 3. Spare Parts List
 - 4. Proposed Testing Methods and Reports of Certified Shop Tests
 - 5. Reports of Certified Field Tests
 - 6. Manufacturer's Representative's Certification
- B. Submittals shall be sufficiently complete in detail to enable the Engineer to determine compliance with Contract requirements.
- C. Submittals will be approved only to the extent of the information shown. Approval of an item of equipment shall not be construed to mean approval for components of that item for which the Contractor has provided no information.
- D. Some individual electrical specification sections may require a Compliance, Deviations, and Exceptions (CD&E) letter to be submitted. If the CD&E letter is required and shop drawings are submitted without the letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this specification section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the

deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.

1.05 APPLICABLE CODES AND REQUIREMENTS

A. Conformance

1. Unless otherwise noted, all work, equipment and materials furnished shall conform with the latest available version of the existing rules, requirements and specifications of the following:
 - a. Insurance Rating Organization having jurisdiction
 - b. The serving electrical utility company
 - c. The currently adopted edition of the National Electrical Code (NEC)
 - d. The National Electric Manufacturers Association (NEMA)
 - e. The Institute of Electrical and Electronic Engineers (IEEE)
 - f. The Insulated Cable Engineers Association (ICEA)
 - g. The American Society of Testing Materials (ASTM)
 - h. The American National Standards Institute (ANSI)
 - i. The requirements of the Occupational Safety Hazards Act (OSHA)
 - j. The National Electrical Contractors Association (NECA) Standard of Installation
 - k. National Fire Protection Association (NFPA)
 - l. International Electrical Testing Association (NETA)
 - m. All other applicable Federal, State/Commonwealth and local laws and/or ordinances.
2. All material and equipment shall bear the inspection labels of Underwriters Laboratories, Inc., if the material and equipment is of the class inspected by said laboratories.

B. Nonconformance

1. Any paragraph of requirements in these Specifications, or Drawings, deviating from the rules, requirements and Specifications of the above organizations shall be invalid and their (the above organizations) requirements shall hold precedent thereto. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra but shall be included in the Bid. Ignorance of any rule, requirement, or Specification shall not be allowed as an excuse for nonconformity. Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

C. Certification

1. Where applicable, upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from the inspection organization having jurisdiction and shall deliver same to the Engineer and the Owner.

1.06 PERMITS AND INSPECTIONS

- A. The Contractor shall reference the General Conditions and Section 01 11 00 – Summary of Work.

1.07 TEMPORARY LIGHTING AND POWER

- A. The Contractor shall reference the General Conditions and Section 01 51 00 – Temporary Utilities.

1.08 TESTS

- A. Upon completion of the installation, the Contractor shall perform tests for operation, load (Phase) balance, overloads, and short circuits. Tests shall be made with and to the satisfaction of the Owner and Engineer.
- B. The Contractor shall perform all field tests and shall provide all labor, equipment, and incidentals required for testing and shall pay for electric power required for the tests. All defective material and workmanship disclosed shall be corrected by the Contractor at no cost to the Owner. The Contractor shall show by demonstration in service that all circuits and devices are in good operating condition. Test shall be such that each item of control equipment will function not less than five (5) times.
- C. Refer to each individual specification section for detailed test requirements.
- D. The Contractor shall complete the installation and field testing of the electrical installation at least two (2) weeks prior to the startup and testing of any equipment served by that electrical equipment. During the period between the completion of

electrical installation and the startup and testing of all other equipment, the Contractor shall make all components of the Work available as it is completed for their use in performing Preliminary and Final Field Tests.

- E. Before each test commences, the Contractor shall submit a detailed test procedure, and also provide test engineer resume, personnel and scheduling information for the approval by the Engineer. In addition, the Contractor shall furnish detailed test procedures for any electrical equipment required as part of the field tests of other systems.

1.09 INFRARED INSPECTION

- A. Just prior to the final acceptance of a piece of equipment, the Contractor shall perform an infrared inspection to locate and correct all heating problems associated with electrical equipment terminations.
- B. Equipment located in hazardous areas shall be excluded from infrared testing requirements since the equipment in those areas is not intended to be operated while the enclosure is open. The infrared inspection shall apply to all new equipment and existing equipment in non-hazardous areas that is in any way modified under this Contract. All heating problems detected with new equipment furnished and installed under the Scope of this Contract shall be corrected by the Contractor at no additional cost to the Owner. All problems detected with portions of existing equipment modified under this Contract shall also be corrected by the Contractor at no additional cost to the Owner.
- C. Any issues detected with portions of existing equipment that were not modified under this Contract are not the responsibility of the Contractor. Despite the Contractor not being held responsible for these problems, the Contractor shall report them to the Owner and Engineer immediately for resolution.
- D. The infrared inspection report shall include both digital and IR pictures positioned side by side. Both the digital and IR pictures shall be clear and high quality. Fuzzy, grainy, or poorly illuminated pictures are not acceptable. The IR picture shall be provided with a temperature scale beside it, and an indication of the hot spot temperature in each picture. Reports shall be furnished in a 3-ring binder, with all pages printed in full color, with equipment assemblies separated by tabs.

1.10 PROTECTIVE DEVICE SETTING AND TESTING

- A. All protective devices in the electrical equipment shall be set, adjusted, calibrated and tested in accordance with the manufacturers' recommendations, the coordination study, and best industry practice.

- B. Proper operation of all equipment associated with the device under test and its compartment shall be verified, as well as complete resistance, continuity and polarity tests of power, protective and metering circuits. Any minor adjustments, repairs and/or lubrication necessary to achieve proper operation shall be considered part of this Contract.
- C. All solid state trip devices shall be checked and tested for setting and operation using manufacturers recommended test devices and procedures.
- D. Circuit breakers and/or contactors associated with the above devices shall be tested for trip and close functions with their protective device.
- E. When completed, the Contractor shall provide a comprehensive report for all equipment tested indicating condition, readings, faults and/or deficiencies in same. Inoperative or defective equipment shall be brought immediately to the attention of the Engineer.
- F. Prior to placing any equipment in service, correct operation of all protective devices associated with this equipment shall be demonstrated by field testing under simulated load conditions.

1.11 SCHEDULES AND FACILITY OPERATIONS

- A. Since the equipment testing required herein shall require that certain pieces of equipment be taken out of service, all testing procedures and schedules must be submitted to the Engineer for review and approval one (1) month prior to any work beginning. When testing has been scheduled, the Engineer must be notified 48 hours prior to any work to allow time for load switching and/or alternation of equipment. In addition, all testing that requires temporary shutdown of facility equipment must be coordinated with the Owner/Engineer so as not to affect proper facility operations.
- B. At the end of the workday, all equipment shall be back in place and ready for immediate use should a facility emergency arise. In addition, should an emergency condition occur during testing, at the request of the Owner, the equipment shall be placed back in service immediately and turned over to Owner personnel.
- C. In the event of accidental shutdown of Owner equipment, the Contractor shall notify Owner personnel immediately to allow for an orderly restart of affected equipment.
- D. Maintaining the operation of these facilities during the duration of the construction period is essential and required. The Contractor shall furnish and install temporary equipment as required to maintain facility operation. Reference Section 01 14 00 – Coordination with Owner's Operations for construction sequencing and specific operational constraint information.

1.12 MATERIALS HANDLING

- A. Materials arriving on the job site shall be stored in such a manner as to keep material free of rust and dirt and so as to keep material properly aligned and true to shape. Rusty, dirty, or misaligned material will be rejected. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Rigid non-metallic conduit shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Adequate protection shall be required at all times for electrical equipment and accessories until installed and accepted. Materials damaged during shipment, storage, installation, or testing shall be replaced or repaired in a manner meeting with the approval of the Engineer. If space heaters are provided in a piece of electrical equipment, they shall be temporarily connected to a power source during storage. The Contractor shall store equipment and materials in accordance with Section 01 55 00 – Contractor Access and Parking.

1.13 WARRANTIES

- A. Unless otherwise specified in an individual specification section, all electrical equipment and electrical construction materials shall be provided with a warranty in accordance with the requirements of Section 46 00 00 – Equipment General Provisions and the General Conditions.

1.14 TRAINING

- A. Unless otherwise specified in an individual specification section, all training for electrical equipment shall be provided in accordance with the requirements of Section 46 00 00 – Equipment General Provisions.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS

- A. Unless otherwise indicated, the materials to be provided under this Specification shall be the products of manufacturers regularly engaged in the production of all such items and shall be the manufacturer's latest design. The products shall conform to the applicable standards of UL and NEMA, unless specified otherwise. International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.
- B. All items of the same type or ratings shall be identical. This shall be further understood to include products with the accessories indicated.
- C. All equipment and materials shall be new, unless indicated or specified otherwise.

- D. The Contractor shall submit proof if requested by the Engineer that the materials, appliances, equipment, or devices that are provided under this Contract meet the requirements of Underwriters Laboratories, Inc., in regard to fire and casualty hazards. The label of or listing by the Underwriters Laboratories, Inc., will be accepted as conforming to this requirement.

2.02 SUBSTITUTIONS

- A. Unless specifically noted otherwise, any reference in the Specifications or on the Drawings to any article, service, product, material, fixture, or item of equipment by name, make, or catalog number shall be interpreted as establishing the type, function, and standard of quality and shall not be construed as limiting competition. The Contractor, in such cases may use any article, device, product, material, fixture, or item of equipment which in the judgment of the Engineer, expressed in writing, is equal to that specified.

2.03 CONCRETE

- A. The Contractor shall furnish all concrete required for the installation of all electrical work, Concrete shall be Class A unless otherwise specified. Concrete and reinforcing steel shall meet the appropriate requirements of Division 03 of the Specifications.
- B. The Contractor shall provide concrete equipment pads for all free-standing electrical apparatus and equipment located on new or existing floors or slabs. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The exact location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of these pads. Equipment pads shall be 4 inches high unless otherwise indicated on the Drawings and shall conform to standard detail for equipment pads shown on the Contract Drawings. Equipment pads shall not have more than 3" excess concrete beyond the edges of the equipment.
- C. The Contractor shall provide concrete foundations for all free-standing electrical apparatus and equipment located outdoors or where floors or slabs do not exist and/or are not or provided by others under this Contract. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of the foundations. Equipment foundations shall be constructed as detailed on the Drawings or if not detailed on the Drawings shall be 6 inches thick minimum reinforced with #4 bars at 12-inch centers each way placed mid-depth. Concrete shall extend 6 inches minimum beyond the extreme of the equipment base and be placed on a compacted stone bed (#57 stone or ABC) 6 inches thick minimum.

PART 3 – EXECUTION

3.01 CUTTING AND PATCHING

A. Coordination

1. The Work shall be coordinated between all trades to avoid delays and unnecessary cutting, channeling and drilling. Sleeves shall be placed in concrete for passage of conduit wherever possible.

B. Damage

1. The Contractor shall perform all chasing, channeling, drilling and patching necessary to the proper execution of this Contract. Any damage to the building, structure, or any equipment shall be repaired by qualified mechanics of the trades involved at the Contractor's expense. If, in the Engineer's judgment, the repair of damaged equipment would not be satisfactory, then the Contractor shall replace damaged equipment at the Contractor's expense.

C. Existing Equipment

1. Provide a suitable cover or plug for openings created in existing equipment as the result of work under this Contract. For example, provide round plugs in equipment enclosures where the removal of a conduit creates a hole and the enclosure. Covers and plugs shall maintain the NEMA rating of the equipment enclosure. Covers and plugs shall be watertight when installed in equipment located outdoors.

3.02 EXCAVATION AND BACKFILLING

- A. The Contractor shall perform all excavation and backfill required for the installation of all electrical work. All excavation and backfilling shall be in complete accordance with the applicable requirements of Division 31.

3.03 CORROSION PROTECTION

- A. Wherever dissimilar metals, except conduit and conduit fittings, come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.

END OF SECTION

SECTION 26 05 19
LOW VOLTAGE CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, connect, test, and place in satisfactory operating condition, all low voltage (insulation rating less than or equal to 1000 volts) wire and cable indicated on the Drawings and as specified herein and/or required for proper operation. The work of connecting cables to equipment and devices shall be considered a part of this Section. All appurtenances required for the installation of wire and cable systems shall be furnished and installed by the Contractor.
- B. The scope of this Section does not include internal wiring factory installed by electrical equipment manufacturers.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 33.16 – Boxes for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Low voltage wire, cable, and appurtenances shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. Underwriters Laboratories (UL)
 - a. UL 13 – Standard for Power-Limited Circuit Cables
 - b. UL 44 – Thermoset-Insulated Wires and Cables
 - c. UL 83 – Thermoplastic-Insulated Wires and Cables
 - d. UL 1277 – Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
 - e. UL 1581 – Reference Standard for Electrical Wires, Cables, and Flexible Cords
 - f. UL 1685 – Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
 - g. UL 2250 – Standard for Instrumentation Tray Cable
 - h. UL 2556 – Wire and Cable Test Methods

2. American Society for Testing and Materials (ASTM)
 - a. ASTM B3 – Standard Specification for Soft or Annealed Copper Wire
 - b. ASTM B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. ASTM B33 – Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
 - d. ASTM D69 – Standard Test Methods for Friction Tapes
 - e. ASTM D4388 – Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes
3. Insulated Cable Engineers Association (ICEA)
 - a. ICEA S-58-679 – Standard for Control, Instrumentation and Thermocouple Extension Conductor Identification
 - b. ICEA T-29-250 – Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input Rate of 210,000 B.T.U./Hour
4. Institute of Electrical and Electronics Engineers (IEEE)
 - a. IEEE 1202 – Standard for Flame Testing of Cables

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the wire and cable manufacturer and submit the following:
 1. Shop Drawings
 2. Reports of Field Tests
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed material's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible Submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Product data sheets for the following:
 - a. Wire and cable
 - b. Power and control wire terminations
 - c. Instrumentation cable terminations

Pulling lubricant.
2. Cable pulling calculations (if required).
3. Wiring identification methods and materials.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 CABLE PULLING CALCULATIONS

- A. Prior to the installation of the wire and cable specified herein, the Contractor shall submit cable pulling calculations for Engineer review and approval when all of the following are true:
1. The amount of cable to be installed will be greater than 200 linear feet between pull points.
 2. The installation will have one or more bends.
 3. The wire and cable is size #1/0 AWG and larger.
- B. Cable pulling calculations shall be performed by a currently registered Professional Engineer in the State or Commonwealth in which the project is located and shall define pulling tension and sidewall loading (sidewall bearing pressure values).

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The wire and cable to be furnished and installed for this project shall be the product of manufacturers who have been in the business of manufacturing wire and cable for a minimum of ten (10) years. Wire and cable shall be designed, constructed, and installed

in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and indicated on the Drawings. Only one (1) manufacturer for each wire and cable type shall be permitted.

2.02 POWER AND CONTROL WIRE AND CABLE

- A. Branch circuit power wiring for motors shall consist of insulated copper conductors rated for 90°C in both wet and dry locations, and 1000V for #8 and larger. Insulated conductors shall be UL 44 Listed as NEC Type XHHW-2 or RHW-2.
- B. Power wire for all other loads and control wire shall consist of insulated copper conductors with a nylon (or equivalent) outer jacket. Conductor insulation shall be rated 90°C for dry locations, 75°C for wet locations, and 600V. Insulated conductors shall be UL 83 Listed as NEC Type THHN/THWN.
- C. Unless specified otherwise herein, conductors shall be stranded copper per ASTM B-8 and B-3, with Class B or C stranding contingent upon the size. Power conductors for lighting and receptacle branch circuits shall be solid copper per ASTM B-3.
- D. Power conductor size shall be no smaller than No. 12 AWG and Control conductor size shall be no smaller than No. 14 AWG.
- E. Multi-conductor cable assemblies shall include a grounding conductor and an overall PVC jacket. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Multi-conductor cable assemblies shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).
- F. Power wire and cable shall be as manufactured by the Okonite Company, the Southwire Company, General Cable, Encore Wire, or equal.

2.03 INSTRUMENTATION CABLE

- A. For single-analog signal applications, instrumentation cable shall consist of a single, twisted pair or triad of individually insulated and jacketed copper conductors with an overall cable shield and jacket. Conductor insulation shall be rated 90°C in both wet and dry locations, and 600V. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Cable shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).
- B. For multiple-analog signal applications, instrumentation cable shall consist of multiple, twisted pairs or triads (i.e. groups) of individually insulated and jacketed copper conductors with individual pair/triad shields (i.e. group shields) and an overall cable shield and jacket. Conductor insulation shall be rated 90°C in both wet and dry locations, and 600V. The jacket shall be PVC and resistant to abrasion, sunlight, and flame in accordance with UL 1277. Cable shall be UL 1277 Listed as NEC Type TC (Power and Control Tray Cable).

- C. Cable and group shields shall consist of overlapped aluminum/polyester tape/foil providing 100% coverage. Instrumentation cables shall include an overall copper shield drain wire. Cables containing multiple twisted pairs or triads shall also include group shield drain wires.
- D. Conductors, including drain wires, shall be tin or alloy coated (if available), soft, annealed copper, stranded per ASTM B-8, with Class B stranding unless otherwise specified.
- E. Instrumentation signal conductor size shall be no smaller than No. 16 AWG.
- F. Instrumentation cable shall be Okoseal-N Type P-OS (for single pair or triad applications) or Okoseal-N Type SP-OS (for multiple pair or triad applications) as manufactured by the Okonite Company, Belden equivalent, Southwire Company equivalent, or equal.

2.04 CONDUCTOR IDENTIFICATION

- A. Conductors shall be identified using a color-coding method. Color coding for individual power, control, lighting, and receptacle conductors shall be as follows:
 - 1. 480/277V AC Power
 - a. Phase A – BROWN
 - b. Phase B – ORANGE
 - c. Phase C – YELLOW
 - d. Neutral – GREY
 - 2. 120/208V or 120/240V AC Power
 - a. Phase A – BLACK
 - b. Phase B – RED
 - c. Phase C – BLUE
 - d. Neutral – WHITE
 - 3. DC Power
 - a. Positive Lead – RED
 - b. Negative Lead – BLACK

4. DC Control
 - a. All wiring – BLUE
 5. 120 VAC Control
 - a. 120 VAC control wire shall be RED except for a wire entering a motor control center compartment, motor controller, or control panel which is an interlock. This interlock conductor shall be color coded YELLOW. For the purposes of this Section, an interlock is defined as any wiring that brings voltage into the above-mentioned equipment from a source outside that equipment.
 6. 24 VAC Control
 - a. All wiring - ORANGE
 7. Equipment Grounding Conductor
 - a. All wiring - GREEN
- B. Individual conductors No. 2 AWG and smaller shall have factory color coded insulation. It is acceptable for individual conductors larger than No.2 AWG to be provided with factory color coded insulation as well, but it is not required. Individual conductors larger than No.2 AWG that are not provided with factory color coded insulation shall be identified by the use of colored tape in accordance with the requirements listed in Part 3 herein. Insulation colors and tape colors shall be in accordance with the color-coding requirements listed above.
- C. Conductors that are part of multi-conductor cable assemblies shall have black insulation. The conductor number shall be printed on each conductor's insulation in accordance with ICEA S-58-679, Method 4. Each conductor No.2 AWG and smaller within the cable assembly shall also be identified with a heat shrink tag with color coded background. Each conductor larger than No.2 AWG within the cable assembly shall also be identified by the use of colored tape. Heat shrink tags and colored tape shall be in accordance with the requirements listed in Part 3 herein. Tape color and heat shrink tag background color shall be in accordance with the color-coding requirements listed above.

2.05 CABLE PULLING LUBRICANTS

- A. Cable pulling lubricants shall be non-hardening type and approved for use on the type of cable installed. Lubricant shall be Yellow #77 Plus by Ideal, Cable Gel by Greenlee, Poly-Gel by Gardner Bender, or equal.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

A. General

1. Wire and Cable shall be installed as specified herein and indicated on the Drawings. Unless specifically indicated otherwise on the Drawings, wire and cable shall be installed in separate raceways according to wiring type. For example, power wiring shall not be combined with control wiring, and control wiring shall not be combined with instrumentation wiring.
2. Wire shall be furnished and installed as single conductor cables, with limited exceptions. Multi-conductor cable assemblies shall only be installed where indicated on the Drawings, required by the NEC, or after obtaining written permission from the Engineer.
3. Where instrumentation cables are installed in control panels, motor controllers, and other locations, the Contractor shall arrange wiring to provide maximum clearance between these cables and other conductors. Instrumentation cables shall not be installed in same bundle or conduit with conductors of other circuits.
4. Instrumentation cable shielding shall be continuous and shall be grounded at one point only.

B. Splices

1. Splices shall not be allowed in power or control wire and cable unless approved in writing by the Engineer. If unique field conditions exist or pulling calculations indicate that splices may be required, the Contractor shall submit a detailed request indicating why splices are required to the Engineer. The Engineer shall be under no obligation to grant such request.
2. Splicing materials shall be barrel type butt splice connectors and heat shrink tubing as manufactured by 3M, Ideal, or equal. The use of screw-on wire connectors (wire nuts) shall only be permitted for lighting and receptacle circuits.
3. No splicing of instrumentation cable is permitted.

C. Wire and Cable Sizes

1. The sizes of wire and cable shall be as indicated on the Drawings, or if not shown, as approved by the Engineer. If required due to field routing, the size of conductors and respective conduit shall be increased so that the voltage drop measured from source to load does not exceed 2-1/2%.

D. Additional Conductor Identification

1. In addition to the color-coding identification requirements specified in Part 2 herein, individual conductors shall be provided with heat shrinkable identification tags. Identification tags for individual conductors shall have a white background where the conductor insulation is colored. Identification tags for individual conductors shall have a colored background where the conductor insulation is black. Background color shall match that of the taping provided on the individual black conductors.
2. Multi-conductor cables shall be provided with heat shrinkable identification tags in accordance with Part 2 herein.
3. All wiring shall be identified at each point of termination. This includes but is not limited to identification at the source, load, and in any intermediate junction boxes where a termination is made. The Contractor shall meet with the Owner and Engineer to come to an agreement regarding a wire identification system prior to installation of any wiring. Wire numbers shall not be duplicated.
4. Wire identification shall be by means of a heat shrinkable sleeve with appropriately colored background and black text. Wire sizes #14 AWG through #10 AWG shall have a minimum text size of 7 points. Wire sizes #8 AWG and larger shall have a minimum text size of 10 points. Sleeves shall be of appropriate length to fit the required text. The use of handwritten text for wire identification shall not be permitted.
5. Sleeves shall be suitable for the size of wire on which they are installed. Sleeves shall not be heat-shrunk onto control cables. Tags shall remain loose on cable to promote easier identification. For all other applications, sleeves shall be tightly affixed to the wire and shall not move. Sleeves shall be heat shrunk onto wiring with a heat gun approved for the application. Sleeves shall not be heated by any means which employs the use of an open flame. The Contractor shall take special care to ensure that the wiring insulation is not damaged during the heating process.
6. Sleeves shall be installed prior to the completion of the wiring terminations and shall be oriented so that they can be easily read.
7. Sleeves shall be polyolefin as manufactured by Brady, Seton, Panduit, or equal.
8. Wire identification in manholes, handholes, pull boxes, and other accessible components in the raceway system where the wiring is continuous (no terminations are made) shall be accomplished by means of a tag installed around the bundled group of individual conductors or around the outer conductor jacket of a multi-conductor cable. Identification shall utilize a FROM-TO system. Each group

of conductors shall consist of all of the individual conductors in a single conduit or duct. The tag shall have text that identifies the bundle in accordance with the 'FROM' and 'TO' column for that particular conduit number in the conduit and wire schedule. Minimum text size shall be 10 point. The tag shall be affixed to the wire bundle by the use of nylon wire ties and shall be made of polyethylene as manufactured by Brady, Seton, Panduit, or equal.

9. Where colored tape is used to identify cables, it shall be wrapped around the cable with a 25% overlap and shall cover at least 2 inches of the cable.

E. Wiring Supplies

1. Rubber insulating tape shall be in accordance with ASTM D4388. Friction tape shall be in accordance with ASTM D69.

F. Training of Cable in Manholes, Handholes, and Vaults

1. The Contractor shall furnish all labor and material required to train cables around cable vaults, manholes, and handholes. Sufficient length of cable shall be provided in each handhole, manhole, and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. The training shall be done in such a manner as to minimize chaffing.
2. Instrumentation cable shall be racked and bundled separate from AC wiring to maintain the required separation as follows:
 - a. 18 inches for 480/277 VAC wiring
 - b. 12 inches for 208/120 VAC wiring
 - c. 6 inches for 24 VAC wiring

G. Conductor Terminations

1. Where wires are terminated at equipment which requires lugs, connections shall be made by solderless mechanical lug, crimp type ferrule, or irreversible compression type lugs. Reference individual equipment Specification Sections as applicable for additional termination requirements.
2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make terminations impractical due to the size of the field wiring, the Contractor shall terminate field wiring in an adjacent junction box per the requirements of Section 26 05 33.16 – Boxes for Electrical Systems, complete with terminal strips. Contractor shall install the smaller wiring from the device to the junction box in a

conduit, using the terminal strip as the means for joining the two different wire sizes. Splicing of wires in lieu of using terminal strips is not acceptable.

3. The cables shall be terminated in accordance with the cable and/or termination product manufacturer's instructions for the cable type.
4. To minimize oxidation and corrosion, wire and cable shall be terminated using an oxide-inhibiting joint compound recommended for "copper-to-copper" connections. The compound shall be Penetrox E as manufactured by Burndy Electrical, or equal.
5. All spare conductors shall be terminated on terminal blocks mounted within equipment or junction boxes. Unless otherwise noted, coiling up of spare conductors within enclosure is not acceptable.

H. Pulling Temperature

1. Cable shall not be installed when the temperature of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature of 40°F or less within a three (3) day period prior to pulling, the cable reels shall be stored three (3) days prior to pulling in a protected storage area with an ambient temperature of 55°F or more. Cable pulling shall be completed during the workday for which the cable is removed from the protected storage. Any cable reels with wire remaining on them shall be returned to storage at the completion of the workday.

3.02 FIBER OPTIC CABLE INSTALLATION

- A. The Contractor shall install the fiber optic cable furnished by the General Contractor and/or the Instrumentation and Control Subcontractor. The cable shall be installed in its respective raceway system(s) as specified herein, indicated on the Drawings, and in accordance with the cable manufacturer's instructions.

3.03 TESTING

- A. All testing shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 1. Shop Test
 - a. Wires and cables shall be tested in accordance with the applicable ICEA Standards. Wire and cable shall be physically and electrically tested in accordance with the manufacturer's standards.
 2. Field Tests

- a. After installation, all wires and cables shall be tested for continuity. Testing for continuity shall be “test light” or “buzzer” style.
- b. After installation, wires and cables shall be tested for insulation resistance levels between conductors of the same circuit and between conductor and ground as follows:
 - 1) For #8 AWG and larger 600V wire and cable, apply 1,000 VDC from a Megohmmeter for one (1) minute. Resistance shall be no less than 100 Megohms.
 - 2) Instrumentation signal cable shall be tested from conductor to conductor, conductor to shield, and conductor to ground using a Simpson No. 260 volt-ohmmeter or approved equal. The resistance value shall be 200 Megohms or greater.
 - 3) Insulation resistance testing is not required for power and control cables smaller than #8 AWG.
- c. Wires and cables shall be tested after required terminations are made, but before being connected to any equipment.
- d. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner. All conductors of a multi-phase circuit shall be replaced if one conductor fails the required testing. If part of a multi-set (parallel conductors per phase) circuit fails testing, only the set containing failure shall be replaced.
- e. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment. Test reports shall be submitted to the Engineer.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install grounding systems complete in accordance with the minimum requirements established by Article 250 of the NEC. Article 250 of the NEC shall be considered a minimum requirement for compliance with this Specification.
- B. Grounding of all instrumentation and control systems shall be furnished and installed in accordance with the manufacturer/system requirements and IEEE 1100. Conflicts shall be promptly brought to the attention of the Engineer.
- C. In addition to the NEC requirements, building structural steel columns shall be permanently and effectively grounded.
- D. Reference Section 26 05 00 – Basic Electrical Requirements

1.02 CODES AND STANDARDS

- A. Equipment and materials covered under this Section shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 467 – Grounding and Bonding Equipment
 - 2. IEEE 81 – Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - 3. IEEE 1100 – Recommended Practice for Power and Grounding Electronic Equipment

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Reports of certified field tests.
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
 - 2. Drawings and written description of how the Contractor intends to furnish and install the grounding system.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 GROUND RODS AND GRID

- A. Ground rods shall be rolled to a commercially round shape from a welded copper-clad steel manufactured by the molten-welding process or by the electro-formed process (molecularly bonded). They shall have an ultimate tensile strength of 75,000 pounds per square inch (psi) and an elastic limit of 49,000 psi. The rods shall be not less than 3/4 inch in diameter by 10 feet in length; and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.010 inch at any point on the rod. Ground rods shall be UL 467 listed. The ground rods shall be manufactured by Erico Products, Blackburn, or equal.
- B. Except where specifically indicated otherwise, all exposed non current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductors in nonmetallic raceways and neutral conductors of wiring systems shall be grounded.
- C. The ground connection shall be made at the main service equipment and shall be extended to the ground grid surrounding the structure. The ground grid shall also be connected to the point of entrance of the metallic water service. Connection to the water pipe shall be made by a suitable ground clamp or lug connection to a plugged tee. If

flanged pipes are encountered, connection shall be made with the lug bolted to the street side of the flanged connection.

- D. Where ground fault protection is employed, care shall be taken so that the connection of the ground and neutral does not interfere with the correct operation of the ground fault protection system.

2.03 FITTINGS

- A. Grounding connections to equipment shall be bolted. Cable end connections shall be made by hydraulic crimp or exothermically welded. Split bolt type connectors are not acceptable. Fittings shall be UL 467 listed.

2.04 EQUIPMENT GROUNDING CONDUCTORS

- A. An insulated equipment grounding conductor, which shall be separate from the electrical system neutral conductor, shall be furnished and installed for all circuits. Insulation shall be of the same type as the ungrounded conductors in the raceway and shall be green in color. Equipment grounding conductors shall be furnished and installed in all conduits. Use of conduits as the NEC required equipment grounding conductor is not acceptable.

2.05 EQUIPMENT GROUNDS

- A. Equipment grounds shall be solid and continuous from a connection at earth to all distribution panelboards. Ground connections at panelboards, outlets, equipment, and apparatus shall be made in an approved and permanent manner.
- B. For all control panels, disconnect switches, and other electrical enclosures, equipment grounds and bonding jumpers shall be terminated individually on a ground bar or mechanical lugs. No wire nuts will be permitted.

2.06 EXOTHERMIC WELDS

- A. All exothermic welding shall be completed per welding kit manufacturer's instructions. Exothermic welds shall be CadWeld by Erico or ThermoWeld.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Metal surfaces where grounding connections are to be made shall be clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease, and dirt. Copper and galvanized steel shall be cleaned with emery cloth to remove oxide before making connections.

B. Ground Grid

1. A main ground grid shall be provided for each structure and interconnecting structure grids consisting of driven ground rods as shown on the Drawings. Ground rods shall be driven straight down into the earth, or if objects are encountered, at an angle to avoid the obstruction.
2. The ground rods shall be interconnected by the use of copper cable exothermically welded to the rods. The grounding cables shall be installed after the excavations for the building have been completed and prior to the pouring of concrete for the footings, mats, etc. Copper "pigtailed" shall be connected to the ground grid and shall enter the buildings and structure from the outside and shall be connected to steel structures, and equipment as described in this Section and as required to provide a complete grounding system. The copper pigtailed shall be exothermically welded to the ground grid and connected to building reinforcement steel by hydraulic crimp.
3. Grounding conductors shall be continuous between points of connection; splices shall not be permitted.
4. Where conductors are exposed and subject to damage from personnel, traffic, etc., conductors shall be installed in metal raceway. The raceway shall be bonded to the grounding system.
5. Where subsurface conditions do not permit use of driven ground rods to obtain proper ground resistance, rods shall be installed in a trench or plate electrodes shall be provided, as applicable and necessary to obtain proper values of resistance.
6. Buried exothermic welds and ground ring shall not be backfilled until inspected by Engineer.

C. Raceways

1. Conduit which enters equipment such as switchgear, motor control centers, transformers, panelboards, variable frequency drives, instrument and control panels, and similar equipment shall be bonded to the ground bus or ground lug, where provided, and as otherwise required by the NEC.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 1. Witnessed Shop Tests

- a. None required.
2. Field Tests
- a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.
 - b. Fall of potential tests shall be performed on the ground grid per IEEE81 recommendations by a third party, independent testing firm. A fall of potential plot shall be submitted at the conclusion of testing for Engineer review. Documentation indicating the location of the rod and grounding system as well as the resistance and soil conditions at the time the measurements were made shall be submitted. Testing shall show that the ground grid has 5 ohms resistance or less. Due to soil conditions and/or unforeseen field conditions, ground resistances greater than 5 ohms may be acceptable if specifically approved in writing by the Engineer. Ground resistance measurements shall be made in normally dry weather not less than 48 hours after rainfall and with the ground grid under test isolated from other grounds.
 - c. Continuity tests for the grounding electrode conductor shall be performed. Test will be accepted when a resistance of less than 1 ohm is shown for this conductor.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install structural supports for mounting and installing all conduit, electrical equipment, lighting, alarm systems, instrumentation, and communications equipment furnished under this Contract.
- B. Equipment shall be installed strictly in accordance with recommendations of the manufacturer and best practices of the trade resulting in a complete, operable, and safe installation. The Contractor shall obtain written installation manuals from the equipment manufacturer prior to installation.
- C. Reference Section 26 05 00 – Basic Electrical Requirements.

1.02 CODES AND STANDARDS

- A. Equipment and materials covered under this Section shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. ASTM A123 – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A153 – Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - 3. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 4. ASTM A276 – Standard Specification for Steel Bars and Shapes
 - 5. ASTM B783 – Standard Specification for Materials for Ferrous Powder Metallurgy Structural Parts

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop drawings

01-10-20

2. Structural support calculations (if required)

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Product data sheets.

2. Complete assembly, layout, installation, and foundation drawings with clearly marked dimensions.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 MATERIALS

A. Support channel shall be 1-5/8" by 1-5/8" minimum, with 12 gage material thickness.

B. Support channel, support channel fittings, and threaded rod shall be furnished with the following material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Material of Construction
Indoor Wet Process Area	Type 304 Stainless Steel
Indoor Dry Process Area	Hot Dipped Galvanized Steel
Indoor Dry Non-process Area	Hot Dipped Galvanized Steel
Indoor Type 1 Chemical Storage/Transfer Area	Fiberglass
Indoor Type 2 Chemical Storage/Transfer Area	Type 304 Stainless Steel
All Outdoor Areas	Type 304 Stainless Steel
All Hazardous Areas	Type 304 Stainless Steel

- C. Fastening hardware (bolts, nuts, washers, and screws) shall be furnished with the following material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Material of Construction
Indoor Wet Process Area	Type 304 Stainless Steel
Indoor Dry Process Area	Type 304 Stainless Steel
Indoor Dry Non-process Area	Type 304 Stainless Steel
Indoor Type 1 Chemical Storage/Transfer Area	Fiberglass
Indoor Type 2 Chemical Storage/Transfer Area	Type 304 Stainless Steel
All Outdoor Areas	Type 304 Stainless Steel
All Hazardous Areas	Type 304 Stainless Steel

PART 3 – EXECUTION

3.01 INSTALLATION

A. Concrete or Masonry Inserts

1. The Contractor shall be responsible for the furnishing and installation of all anchor bolts, masonry inserts, and similar devices required for installation of equipment furnished under this Contract.
2. If a time delay for the arrival of any special inserts or equipment drawings, etc. occurs, the Contractor may, if permitted by the Engineer, make arrangements for providing approved recesses and openings in the concrete or masonry and, upon subsequent installation, the Contractor shall be responsible for filling in such recesses and openings. Any additional costs that may be incurred by this procedure shall be borne by the Contractor.
3. The Contractor shall furnish leveling channels for all switchgear, switchboards, motor control centers, and similar floor mounted equipment. The leveling channels shall be provided for embedment in the equipment housekeeping pads. Coordination of the installation of these channels with the concrete pad is essential and required. Pad height shall be as required to maintain concrete coverage of the reinforcement bars while not causing associated equipment to exceed the maximum mounting height requirements of the NEC.

B. Support Fastening and Locations

1. All equipment fastenings to columns, steel beams, and trusses shall be by beam clamps or welded. No holes shall be drilled in the steel.
2. Unless otherwise indicated on the Drawings or in the Specifications, guards/handrails shall not be utilized as supports for electrical equipment, devices,

or appurtenances. Guards/handrails shall not be cut, drilled, or otherwise modified in order to accommodate electrical supports without written approval from the Engineer.

3. All holes made in reflected ceilings for support rods, conduits, and other equipment shall be made adjacent to ceiling grid bars where possible, to facilitate removal of ceiling panels.
4. Support channel shall be provided wherever required for the support of starters, switches, panels, and miscellaneous equipment.
5. All equipment, devices, and raceways that are installed on the dry side of a water bearing wall shall not be installed directly onto the wall. Support channel shall be used to allow ventilation air to pass behind the equipment, devices, or raceway.
6. All supports shall be rigidly bolted together and braced to make a substantial supporting framework. Where possible, control equipment shall be grouped together and mounted on a single framework.
7. Aluminum support members shall not be installed in direct contact with concrete. Stainless steel or non-metallic "spacers" shall be used to prevent contact of aluminum with concrete.
8. Actual designs for supporting framework should take the nature of a picture frame of support channels and bracket with a plate for mounting the components. The Contractor is responsible for the design of supporting structure; Contractor shall submit design details to the Engineer for acceptance before proceeding with the fabrication.
9. Wherever dissimilar metals come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.
10. For all installations where fiberglass supporting materials are required, the Contractor shall submit structural calculations and the details of the proposed system of support. Structural calculations shall be signed and sealed by a registered Professional Engineer in the State or Commonwealth in which the project is located.
11. For the following installations where conduits are provided with a support system suspended from the above or attached to a vertical structure, the Contractor shall submit structural calculations and details of the proposed system of support. Structural calculations shall be signed and sealed by a registered Professional Engineer in the State or Commonwealth in which the project is located.
 - a. A quantity of twelve (12) or more conduits trade size 1" and smaller are proposed for a conduit support rack.

- b. A quantity of eight (8) or more conduits trade sizes 1 1/2" to 2 1/2" are proposed for a conduit support rack.
 - c. A quantity of four (4) or more conduits trade sizes 3" and larger are proposed for a conduit support rack.
12. Single conduits installed exposed along walls and ceilings shall be secured to the wall or ceiling with a one-hole conduit clamp and clamp-back. Where multiple conduits are installed exposed together, support channel and conduit clamps shall be used.
- C. Equipment, boxes, and enclosures which are factory-constructed with integral mounting provisions (such as brackets., mounting feet, bolt holes, etc.) shall be installed/supported utilizing those mounting provisions. Equipment, boxes and enclosures shall not be field-modified by any means which compromises the UL listing or NEMA rating of the enclosure/assembly.

END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The scope of work under this Section includes furnishing and installing all pull boxes, junction boxes, and outlet boxes.
- B. Requirements for other boxes and enclosures are not included in this Section. Reference each specific equipment Section for requirements related to that equipment's respective enclosure.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 33.13 – Conduit for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Boxes shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 514A – Metallic Outlet Boxes
 - 2. UL 514C – Standard for Non-metallic Outlet Boxes, Flush Device Boxes, and Covers
 - 3. UL 50 – Enclosures for Electrical Equipment, Non-environmental Considerations
 - 4. UL 50E – Enclosures for Electrical Equipment, Environmental Considerations
 - 5. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - 6. NEMA 250 – Enclosures for Electrical Equipment

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer(s) and submit the following:
 - 1. Shop Drawings
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible Submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets for boxes, terminal strips, and all accessories

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.
- B. As-built drawings showing dimensions, internal box layout, terminal strip information, and terminal strip identification information shall be provided for all junction boxes. As-built drawings are not required for pull boxes or outlet boxes.

1.06 IDENTIFICATION

- A. Each pull and junction box shall be identified with the box name as indicated on the Contract Drawings (e.g., PPB-XXX, CJB-YYY) or as directed by the Engineer. A nameplate shall be securely affixed in a conspicuous place on each box. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 PULL AND JUNCTION BOXES

- A. General

1. All pull and junction boxes shall be UL listed and labeled.
2. Pull and junction boxes shall not be provided with eccentric or concentric knockouts.
3. Pull and junction boxes mounted embedded in concrete shall be UL listed for embedment.
4. Where metallic boxes are used, they shall be of all welded construction. Tack welded boxes are not acceptable.

B. Pull Boxes

1. Metallic pull boxes in non-hazardous locations and in hazardous locations where general-purpose enclosures are permitted (e.g., Class I, Division 2 locations) shall be provided with a matching gasketed cover. For covers with dimensions of less than 12 inches by 12 inches, the cover shall be held in place by stainless steel machine screws. Other screw types are not acceptable. For covers with dimensions 12 inches by 12 inches and larger, the cover shall be hinged and held in place by 1/4-turn style latches. Latch mechanism shall be all stainless steel. Hinge pins shall be removable.
2. Metallic pull boxes in hazardous locations where general-purpose enclosures are not permitted (e.g., Class I, Division 1 locations) shall be provided with a matching gasketed cover. Cover shall be hinged and held in place by stainless steel bolts. Hinge pins shall be removable. Covers shall be installed, and bolts torqued in accordance with manufacturer requirements to maintain the hazardous location rating of the enclosure.
3. Non-metallic pull boxes shall be provided with a matching gasketed cover. The cover shall be hinged and held in place by quick-release (e.g., "flip") latches. Latch material of construction shall match the box material and include stainless steel hasps. For covers with dimensions 24 inches by 24 inches and larger, a 3-point latching mechanism with external pad-lockable handle may be substituted. Latch mechanism and handle shall be all stainless steel. Hinge pins shall be removable.
4. Pull boxes shall not have any wire terminations inside, other than those for grounding/bonding. A ground bar shall be provided with the necessary number of screw type terminals. Twenty (20) percent of the total amount of terminals otherwise required for the pull box (minimum of two) shall be provided as spare terminations. Boxes requiring any other wire terminations shall be furnished and installed in accordance with the requirements for junction boxes herein.

5. Pull boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC.
6. Barriers shall be provided in pull boxes to isolate conductors of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolation shall be provided between the following groups:
 - a. Power wiring
 - b. AC control wiring
 - c. DC control wiring
 - d. Instrumentation wiring

C. Junction Boxes

1. Metallic junction boxes in non-hazardous locations shall be provided with a matching gasketed cover. For covers with dimensions of less than 12 inches by 12 inches, the cover shall be held in place by stainless steel machine screws. Other screw types are not acceptable. For covers with dimensions 12 inches by 12 inches and larger, the cover shall be hinged and held in place by 1/4-turn style latches. Latch mechanism shall be all stainless steel. Hinge pins shall be removable.
2. Metallic junction boxes in hazardous locations shall be provided with a matching gasketed cover. Cover shall be hinged and held in place by stainless steel bolts. Hinge pins shall be removable. Covers shall be installed, and bolts torqued in accordance with manufacturer requirements to maintain the hazardous location rating of the enclosure.
3. Non-metallic junction boxes shall be provided with a matching gasketed cover. The cover shall be hinged and held in place by quick-release (e.g., "flip") latches. Latch material of construction shall match the box material and include stainless steel hasps. For covers with dimensions 24 inches by 24 inches and larger, a 3-point latching mechanism with external pad-lockable handle may be substituted. Latch mechanism and handle shall be all stainless steel. Hinge pins shall be removable.
4. Barriers shall be provided in junction boxes to isolate conductors and terminal blocks of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolation shall be provided between the following groups:
 - a. Power wiring

- b. AC control wiring
 - c. DC control wiring
 - d. Instrumentation wiring
5. Junction boxes used for lighting and receptacle circuits only shall be allowed to have screw-on (wire nut) type connectors for wire terminations/junctions.
 6. Junction boxes for all uses other than lighting and receptacle circuits shall be provided with terminal strips, consisting of the necessary number of screw type terminals. Current carrying parts of the terminal blocks shall be of ample capacity to carry the full load current of the circuits connected, with a 10A minimum capacity. Terminal strips shall be rated for the voltage of the circuits connected. A separate ground bar shall be provided with the necessary number of screw type terminals. Twenty (20) percent of the total amount of terminals otherwise required for the junction box (minimum of two) shall be provided as spare terminations. When barriers are provided within the box, separate terminal strips shall be provided in each barrier area. Terminals shall be lettered and/or numbered to conform to the wiring labeling scheme in place on the project.
 7. Junction boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC. Terminal blocks (including spare terminals) shall be considered when sizing the junction box.

D. Enclosure Types and Materials

1. In non-hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Painted Steel
Indoor Dry Non-Process Area	NEMA 1, Painted Steel
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, Fiberglass or PVC
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Type 304 Stainless Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

2. In hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 4X, Type 304 Stainless Steel
Class II, Division 1, Group F	NEMA 9, Die Cast Aluminum
Class II, Division 2, Group F	NEMA 4X, Type 304 Stainless Steel

3. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs.
4. Where located outdoors or in indoor wet process areas, NEMA 7 and NEMA 9 enclosures shall also carry a NEMA 4X rating.

2.03 OUTLET BOXES

A. General

1. Outlet boxes shall be provided with a trim appropriate for the wiring device installed inside. Reference Section 26 27 26 – Wiring Devices for outlet box trim requirements. An appropriate outlet box trim is required to achieve the NEMA rating of the outlet boxes as specified herein.

B. Surface Mount Outlet Boxes

1. Outlet boxes shall be the deep type, no less than 2.5 inches deep.
2. Outlet boxes shall be provided in single or multi-gang configuration as required, sized in accordance with the requirements of the NEC.
3. In non-hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Cast Aluminum or PVC Coated Steel

Indoor Dry Process Area	NEMA 1, Cast Aluminum
Indoor Dry Non-process Area	NEMA 1, Cast Aluminum
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, PVC
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Cast Aluminum or PVC Coated Steel
All Outdoor Areas	NEMA 4X, Cast Aluminum or PVC Coated Steel

4. In hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 4X, Cast Aluminum or PVC Coated Steel
Class II, Division 1, Group F	NEMA 9, Die Cast Aluminum
Class II, Division 2, Group F	NEMA 4X, Cast Aluminum or PVC Coated Steel

5. Outlet boxes shall be provided with integral threaded conduit hubs mounted external to the box. Boxes with threaded conduit hubs mounted internal to the box or as a part of the box wall are not acceptable.

C. Flush Mount Outlet Boxes

- Outlet boxes shall be no less than 2-1/8 inches deep, and 4-11/16 inches square. Boxes shall be UL listed and labeled. Pre-punched single diameter conduit knockouts are acceptable; however, concentric and eccentric knockouts are not acceptable.
- Outlet boxes mounted flush in CMU walls shall be made of galvanized, tack welded steel, and suitable for installation in masonry walls. Sectional type boxes are not acceptable for this application.
- Outlet boxes mounted flush in gypsum walls shall be made of galvanized pressed steel. Tack welded boxes are not acceptable for this application. Sectional type boxes are not acceptable for this application.
- Outlet boxes mounted cast into concrete shall be concrete tight and made of galvanized steel or PVC.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Pull and Junction Boxes

1. Pull boxes and junction boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Box penetrations for conduits shall be made with a punch tool, and penetrations shall be of the size required for the conduit entry and/or hub. Oversized penetrations in boxes are not acceptable.
4. Watertight conduit hubs shall be provided for boxes where a NEMA 4X enclosure rating is specified. Reference Section 26 05 33.13 – Conduit for Electrical Systems for conduit hub requirements.
5. Pull and junction boxes may be installed flush mounted in gypsum, concrete or CMU walls where appropriate provided that covers are easily removed or opened.
6. Pull and junction boxes shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

B. Outlet Boxes

1. Outlet boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Flush mounted outlet boxes shall be arranged and located so that tile and grout lines fit closely around the boxes, and so placed that the cover or device plate shall fit flush to the finished wall surface.
4. Outlet boxes shall be flush mounted in finished areas and other areas where practical. Flush mounted outlet boxes shall not be installed in hazardous areas and type 1 or 2 chemical storage/transfer areas.

5. For the below-named items, mounting heights from finished floor, or finished grade to top is applicable, depending on the type of wiring device to be installed in the outlet box. Mounting heights for outlet boxes shall be as follows, unless otherwise specified herein, indicated on the Drawings, or required by the Americans with Disability Act (ADA):
 - a. Light switches and wall mounted occupancy sensors, 48 inches
 - b. Receptacles in indoor dry process/non-process areas, 16 inches
 - c. Receptacles in indoor wet process areas and all indoor chemical storage/transfer areas, 48 inches
 - d. Receptacles in outdoor locations, 24 inches
 - e. Ceiling mounted occupancy sensors, as indicated on the Drawings
6. Outlet boxes shall be provided in the material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. All electrical equipment shall be properly identified in accordance with these Specifications and the Contract Drawings. All switchgear, switchboards, motor control centers, variable frequency drives, lighting and distribution panelboards, combination starters, control panels, pull and junction boxes, enclosures, disconnect switches, control stations, and similar equipment shall be identified in the manner described, or in an equally approved manner.
- B. The types of electrical identification specified in this Section include, but are not limited to, the following:
 - 1. Operational instructions and warnings.
 - 2. Danger signs.
 - 3. Equipment/system identification signs.
 - 4. Nameplates.

1.02 SIGNS

- A. "DANGER-HIGH-VOLTAGE" signs shall be securely mounted on the entry doors of all electrical rooms.

1.03 LETTERING AND GRAPHICS

- A. The Contractor shall coordinate names, abbreviations, and other designations used in the electrical identification work with the corresponding designations shown, specified, or scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturers, or as required for proper identification and operation/maintenance of the electrical systems and equipment.

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

1.05 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The material covered by these Specifications is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and shown on the Drawings.

2.02 NAMEPLATES

- A. Nameplates shall be engraved, high pressure plastic laminate, white with black lettering.
- B. Nameplates shall be attached to NEMA 4X enclosures utilizing UL-recognized mounting kits designed to maintain the overall UL Type rating of the enclosure. Mounting kit fasteners shall be stainless steel Type AHK10324X as manufactured by Hoffman, or equal.

2.03 HIGH VOLTAGE SIGNS

- A. Standard "DANGER" signs shall be of baked enamel finish on 20 gage steel; of standard red, black, and white graphics; 14 inches by 10 inches size except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where a larger size is needed for adequate identification.

2.04 CONDUIT IDENTIFICATION

- A. Conduit identification shall be as specified in Section 26 05 33.13 – Conduit for Electrical Systems.

2.05 WIRE AND CABLE IDENTIFICATION

- A. Field installed wire and cable identification shall be as specified in Section 26 05 19 – Low Voltage Conductors and Cable and Section 26 05 13 – Medium Voltage Cables.
- B. A plastic laminate nameplate shall be provided at each panelboard, motor control center, switchgear assembly, and switchboard assembly. This nameplate shall be used to clearly convey the conductor identification means used at that piece of equipment (i.e., Phase A=Brown, Phase B=Orange, C = Yellow).
- C. Wiring identification for factory installed wiring in equipment enclosures shall be as specified in the respective Section.

2.06 BOX IDENTIFICATION

- A. Pull, junction and device box identification shall be as specified in Section 26 05 33.16 – Boxes for Electrical Systems.

2.07 ARC FLASH LABELING

- A. New equipment shall have arc-flash labeling per NFPA 70E latest edition.

PART 3 – EXECUTION

3.01 NAMEPLATES

- A. Nameplates shall be attached to the equipment enclosures with (2) two stainless steel sheet metal screws for nameplates up to 2-inches wide. For nameplates over 2-inches wide, four (4) stainless steel sheet metal screws shall be used, one (1) in each corner of the nameplate. The utilization of adhesives is not permitted.

3.02 OPERATIONAL IDENTIFICATION AND WARNINGS

- A. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install plastic signs or similar equivalent identification, instruction, or warnings on switches, outlets, and other controls, devices, and covers or electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes. Signs shall be attached as specified above for nameplates.

3.03 POWER SOURCE IDENTIFICATION

- A. After installation of all field equipment (i.e., valves, motors, fans, unit heaters, instruments, etc.) install nameplates at each power termination for the field equipment. Nameplate data shall include equipment designation (tag number), power source (MCC (Motor Control Center) number, panelboard, etc.), circuit number, conduit number from schedule and voltage/phase.
- B. Contractor to coordinate with the Engineer and the Owner regarding exact nameplate placement during construction.
- C. Nameplates shall be as specified herein.

END OF SECTION

SECTION 26 05 60
LOW-VOLTAGE ELECTRIC MOTORS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, materials, tools and equipment necessary for furnishing, installing, connecting, testing and placing into satisfactory operation all low voltage electric motors as shown on the Drawings and specified herein. All motors required for this Contract shall comply with this Section unless otherwise noted.

1.02 CODES AND STANDARDS

- A. Motors and related accessories shall be designed, manufactured, and/or listed to the following standards as applicable:
1. Institute of Electrical and Electronics Engineers (IEEE)
 - a. IEEE 112 – Standard Test Procedure for Polyphase Induction Motors and Generators
 2. National Electrical Manufacturer's Association (NEMA)
 - a. NEMA MG 1 – Motors and Generators
 3. Underwriters Laboratories (UL)
 - a. UL 547 – Standard for Safety Thermal Protectors for Motors
 - b. UL 674 – Electric Motors and Generators for Use in Hazardous (Classified) Locations
 - c. UL 1004-1 – Standard for Rotating Electrical Machines
 - d. UL 1004-3 – Standard for Thermally Protected Motors
 - e. UL 1004-8 – Standard for Inverter Duty Motors

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
1. Shop Drawings.

2. Spare Parts List.

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Individual shop drawings for electric motors shall be submitted in accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, unless submitted as a part of the shop drawings for the driven equipment.

D. Shop drawings for electric motors shall include motor data sheets, dimensioned drawings, wiring diagrams for devices such as space heaters, temperature devices, and shaft grounding rings. Shop drawings shall identify electric characteristics and design, mechanical construction, manufacturer's name, type and pertinent specifications for the use intended, along with the name of the equipment to be driven. For motors rated 50 horsepower or greater, submittal of motor data for acceptance shall include, as a minimum, the following:

1. Manufacturer's type and frame designation
2. Horsepower rating
3. Time rating (per NEMA Standards)
4. Ambient temperature rating
5. Motor winding insulation system designation
6. RPM at rated load
7. Frequency
8. Number of phases
9. Rated-load amperes
10. Voltage
11. Code letter (starting KVA per horsepower)

12. Design letter for integral horsepower induction motors (per NEMA Standards)
 13. Service factor
 14. Temperature rise at full load and at service factor load
 15. Efficiency at 1/4, 1/2, 3/4 and full load
 16. Power factor at 1/4, 1/2, 3/4 and full load
 17. Motor outline, dimensions and weight
 18. Motor winding insulation system description
 19. Horsepower required by connected machine at specified conditions (load curves) shall be supplied for all compressors, propeller and positive displacement pumps.
 20. The foregoing data shall also be verified after manufacture and shall be included with the information to be furnished in the operation and maintenance manuals specified.
- E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. Electric motors shall be manufactured by Baldor/Reliance Electric Company; Nidec Motors; Toshiba Industrial and Power Systems, Inc.; Siemens Energy & Automation, Inc.; General Electric Company; or equal.

2.02 MATERIALS AND CONSTRUCTION

- A. Motors shall be built in accordance with the latest standards of NEMA, including, but not limited to MG-1 and MG-2, IEEE, ANSI and to the requirements specified herein.
- B. Type
1. Unless otherwise noted, motors specified herein shall be polyphase squirrel cage, NEMA Design B, or single-phase capacitor or repulsion start induction motors. Special equipment requiring a motor drive with unusual characteristics shall be equipped with a definite purpose motor to meet the necessary requirements.
 2. Unless otherwise shown or specified, all motors 1/2 horsepower or larger shall be three-phase, 60 Hertz, NEMA Design B, squirrel cage induction motors designed for operation at 480 volts or greater as specified herein or shown on the Drawings.
 3. Unless otherwise specified in the individual equipment specification for the driven equipment, or as required by the dynamic characteristics of the load as determined by the manufacturer of the machine to be driven, all polyphase squirrel cage motors shall be designed to withstand the starting voltage shown on the Drawings and shall have torque and locked rotor current characteristics as specified for NEMA Design B motors.
 4. All motors 2 horsepower and smaller shall have windings encapsulated with a flexible epoxy compound, or insulated with a flexible epoxy compound, or insulated with the manufacturer's premium quality system which shall be subject to acceptance by the Engineer.
 5. All motors above 250 horsepower shall have stator windings vacuum impregnated with a polyester insulation compound.
 6. Unless otherwise noted, all motors smaller than 1/2 horsepower shall be standard single-phase capacitor start or repulsion start induction type designed for operation on 120 volts or 208 volts, 60 Hz alternating current. The motor shall deliver rated load without exceeding an 80 degree C temperature rise while operating in a 40 degree C ambient temperature. Small fan motors less than 1/4 HP may be splitphase or shaded pole type. Shaded pole motors rated more than 1/4 horsepower are not acceptable. Fractional horsepower motors shall be completely equipped with all necessary auxiliary components for starting and labeled as "Thermally Protected". Insulation shall be Class B, except that submersible motors shall have epoxy encapsulation. Unless otherwise noted, the motors shall be totally enclosed. Small fan motors may be of the open type where they are suitably protected from moisture dripping and lint accumulation. Motors shall be provided with sealed ball bearings lubricated for 10 years of normal use.

7. Where specified, vertical hollow shaft motors shall be designed to carry the motors', pumps', and associated equipment's full thrust. The motors shall be equipped with grease lubricated spherical roller thrust bearings and lower radial guide bearings. Vertical hollow shaft motors shall be fitted with non-reversing ratchet assemblies where required by equipment specifications. Vertical adjustment shall be provided by means of a lockable nut at the top of the shaft.
8. Vertical hollow shaft motors shall have adequate thrust bearings to carry all motor loads and any other operating equipment loads. Horizontal motors shall not be installed where subjected to external thrust loads.

C. Rating

1. Each motor shall develop ample torque for its required service through its acceleration range and throughout its rated load range. The rating of the motors offered shall in no case be less than the horsepower shown on the Drawings or elsewhere specified. It should be noted that the motor sizes indicated on the Drawings or as otherwise specified herein, are motor sizes required to operate the specific equipment which is specified. Higher rated motor sizes may be determined from the actual equipment submitted, approved, purchased, and installed. Protective devices, motor starters, disconnect switches, and other necessary equipment shall be furnished and installed for the actual motor sizes required at no additional cost.
2. Motor ratings shall be based on continuous operation. The maximum temperature rise for open and drip proof type motors shall not exceed 90 degrees C, and for totally enclosed type motors shall not exceed 80 degrees C.

D. Motor Winding Insulation

1. Insulation shall be as specified for each particular type or class of motor. The insulation system shall provide a high dielectric strength, long life covering for the windings which may be required to operate in a continually damp, corrosive, and/or chemically contaminated environment. The insulation shall be resistant to attack by moisture, acids, alkalies, abrasives, and mechanical and thermal shock. Leads shall be sealed with a non-wicking, non-hydroscopic insulation material.
2. Motor insulation resistance may be checked at any time after delivery to the job site or during the warranty period. Encapsulated motor stators may be subjected to insulation testing while completely submerged in water. Any motor not meeting the requirements specified herein will be rejected and shall be promptly replaced at no cost to the Owner.
3. Torque and locked rotor current characteristics for three phase motors shall be NEMA Design B. The locked rotor kVA/HP input at full voltage for 10 horsepower.

motors and larger shall not exceed that permitted for Code Letter "J", except for specialized equipment requiring a motor drive with special definite characteristics.

4. Unless otherwise specified, non-inverter duty motors shall be furnished with a Class F insulation system. Unless otherwise specified, inverter duty motors shall be furnished with a Class H insulation system. In either case, temperature rise shall be limited to that for Class B insulation. Output torque and speed characteristics of each motor shall be suitable to operate the driven equipment through the full range of acceleration and operating load conditions without exceeding the nameplate current rating, and/or temperature rise.

E. Nameplates

1. The motor manufacturer's nameplate shall be engraved, embossed, or stamped on a stainless steel sheet and fastened to the motor frame with No. 4 or larger oval head stainless steel screws or drive pins.
2. Nameplates shall include as a minimum, Items 1 through 14 as listed in Article 1.04 D in addition to that required by NEMA standards. The nameplate shall be positioned so as to be readily visible for inspection as installed in the facility.

F. Design

1. Motors shall be designed to accelerate and drive the connected equipment under all normal operating conditions without exceeding nameplate ratings.
2. Motors specified for operation with variable frequency drives shall be inverter duty rated. Motors shall be considered inverter duty rated only if they meet all of the requirements for NEMA MG-1 Part 31.
3. Motors shall be designed to output 100 percent of nameplate horsepower under continuous duty service without exceeding the temperature rise specified herein when controlled by the actual drives furnished. Inverter duty motors shall be designed to operate down to 10% of full load speed without the need for a line powered cooling fan.
4. Unless otherwise specified, electric motors shall be furnished with a 1.15 service factor.
5. Design selection with respect to the driven machine shall be such that the requirements do not exceed 85 percent of the motors' maximum rating modified by service factor, ambient temperature, enclosure, altitude and electrical service. The electrical service conditions shall be assumed to be 10 percent undervoltage, 5 percent underfrequency, and 3 percent voltage unbalance. Altitude shall be assumed to be the project site elevation plus 10 percent. Ambient temperature shall be assumed to be 95 degrees F in exterior locations, 104 degrees F (40 degrees C) in interior locations, and 122 degrees F (50 degrees C) within housings

or enclosures; except where higher temperatures may be encountered within or on individual items of equipment. The applicable paragraphs of NEMA MG-1 shall be used in making the design selection.

6. Motors used with belt drives shall have sliding bases to provide for belt take up.
7. Terminal boxes shall be of sufficient size to accommodate the required quantity and size of conduits. Gasketed terminal boxes shall be furnished with all splash-proof and totally enclosed motors. NEMA ratings of the terminal boxes shall be suited for the application. Motors located in hazardous locations shall be furnished with terminal boxes suitable for the specific Class, Division, and Group suitable for the application. Terminal boxes shall be sized to accommodate accessory equipment such as motor differential current transformers, where required.
8. Terminal boxes for horizontal motors shall be located on the left-hand side when viewing the motor from the drive shaft end and shall be so designed that conduit entrance can be made from above, below, or either side of the terminal box.
9. Motors larger than 250 hp shall be manufactured with the six stator coil leads wired to a suitably sized motor junction box for application in a differential relay scheme. Current transformers shall be provided by the motor manufacturer and installed in the factory. All ground connections and current transformer connections shall be made in the factory.

G. Construction

1. Frames, mounting means, and shafts shall meet NEMA Standards for the horsepower, RPM, and enclosure selected. Enclosures shall be selected according to the degree of mechanical protection required and shall not be of aluminum construction. All motors shall have a manufacturer's standard shop machinery finish, consisting of a rust-resisting priming coat of zinc chromate and a finish coat of alkyd machinery enamel. Reference Section 09 90 00 – Painting.
2. Motors shall have cast iron frames and a heavy gauge steel terminal box, with neoprene gaskets between the frame and the box and between the box and its cover. A grounding lug(s) shall be provided inside the terminal box.
3. Motors weighing more than 50 pounds shall be equipped with at least one lifting eye. All lifting hardware shall be corrosion resistant.
4. Motors located in hazardous locations shall be totally enclosed and suitable for the specific Class, Division, and Group suitable for the application.
5. Motors located in Class I or II, Division 1 hazardous locations shall bear a U.L.-674 label and shall be provided with a breather/drain approved for the hazardous

location. The U.L. listed breather/drain shall prevent the entrance of contaminants while allowing moisture to drain out of the motor.

6. When located outdoors, or elsewhere if specified, motors shall be totally enclosed, nonventilated (TENV) or totally enclosed, fan cooled (TEFC) motors, unless otherwise noted. Totally enclosed motors shall be provided with two (2) 1/4-inch drain holes drilled through the bottom of the frame, which allows complete drainage of the frame. Where specified, TEFC motors controlled by a variable frequency drive shall be provided with a separately powered cooling fan motor that runs at 60HZ to ensure proper cooling of the motor at low speeds. Cooling fan motor shall be integrally powered from the motor. Vertically oriented motors located outdoors shall be provided with a drip cover over the fan end to prevent accumulation of precipitation.
7. Unless otherwise specified, motors rated 10-horsepower or greater located outdoors, in unheated structures, in below grade areas, or as otherwise indicated, shall be furnished with space heaters and embedded motor winding high temperature switches with leads brought out of the motor terminal box. Space heaters shall be suitable for 120VAC operation and for a maximum surface temperature of less than 200 degrees C. Space heaters shall be of sufficient wattage to maintain the internal temperature of the motor at approximately 10 degrees C above the ambient temperature when the motor is not running.
8. Embedded motor winding temperature switches shall operate at temperatures well below the temperature rating of the motor winding insulation system. Motor winding temperature switches are not required where other temperature monitoring devices (e.g., RTD's) are required.
9. Unless otherwise specified in the equipment specifications, motors rated 300 HP or greater that are controlled by a VFD shall be furnished with resistance thermal detectors (RTD's) embedded in the stator windings, two per phase. RTD's shall be pre-wired to terminal blocks located in a separate terminal box as specified herein.
10. Unless otherwise specified in the equipment specifications, motors rated less than 300 HP that are controlled by a VFD shall be furnished with motor winding high temperature switches embedded in the stator windings with the leads brought out to the motor terminal box.
11. If so specified and when located in indoor areas which are heated and weatherproof, motors shall be open drip-proof machines. Ventilation openings shall be arranged to prevent the entrance of drops of liquid or solid particles at any angle from zero to 15 degrees downward from vertical.
12. Unless otherwise specified, or required, motors rated less than 200 horsepower shall be furnished with bearings of the grease lubricated, antifriction ball type with conveniently located grease fittings and drain plugs. A means of preventing

bearings from becoming over-greased shall be provided. Bearings shall have a minimum B-10 life of 20,000 hours.

13. Rotors shall be statically and dynamically balanced. Rotor windings shall be one-piece cast aluminum. Where applicable, rotors shall be constructed with integral fins.
14. Externally mounted motor shaft grounding rings shall be provided to protect motors against motor shaft and bearing currents. Grounding rings shall be provided for all motors controlled by VFDs, with the following exceptions:
 - a. Motors located in hazardous areas
 - b. Motors rated less than 1 horsepower
 - c. Submersible motors
15. All motors shall be provided with factory-installed one-hole terminations (ring terminals) on the ends of all motor leads. Terminations shall be identified for use with cables that have stranding other than Class B and shall be the irreversible compression type.
16. Motors shown, on the drawings, with an auxiliary cooling fan shall be provided and installed by the motor manufacturer. A separate fan motor 120V, 1PH circuit will be provided an existing panel. Fan motor voltage shall be controlled from the associated VFD.

H. Power Factor and Efficiency

1. All motors, including vertical hollow shaft motors, in the range of 1-500 horsepower, inclusive, shall be designed specifically for energy efficiency and high-power factor. The motor efficiency and power factor shall meet or exceed the values listed in the table below when the motors are tested in accordance with the NEMA preferred test method IEEE 112A, Method B, Dynamometer. Each motor shall meet the minimum guaranteed efficiency value indicated in the table below. All tests shall be performed in accordance with the procedures contained in NEMA Standard MG1-12.58.

**Table 12-11
FULL-LOAD EFFICIENCIES OF ENERGY EFFICIENT MOTORS
ENCLOSED MOTORS**

HP	2 POLE		4 POLE		6 POLE		8 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1	75.5	72	82.5	80	80	77	74	70

**Table 12-11
FULL-LOAD EFFICIENCIES OF ENERGY EFFICIENT MOTORS
ENCLOSED MOTORS**

HP	2 POLE		4 POLE		6 POLE		8 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1.5	82.5	80	84	81.5	85.5	82.5	77	74
2	84	81.5	84	81.5	86.5	84	82.5	80
3	85.5	82.5	87.5	85.5	87.5	85.5	84	81.5
5	87.5	85.5	87.5	85.5	87.5	85.5	85.5	82.5
7.5	88.5	86.5	89.5	87.5	89.5	87.5	85.5	82.5
10	89.5	87.5	89.5	87.5	89.5	87.5	88.5	86.5
15	90.2	88.5	91	89.5	90.2	88.5	88.5	86.5
20	90.2	88.5	91	89.5	90.2	88.5	89.5	87.5
25	91	89.5	92.4	91	91.7	90.2	89.5	87.5
30	91	89.5	92.4	91	91.7	90.2	91	89.5
40	91.7	90.2	93	91.7	93	91.7	91	89.5
50	92.4	91	93	91.7	93	91.7	91.7	90.2
60	93	91.7	93.6	92.4	93.6	92.4	91.7	90.2
75	93	91.7	94.1	93	93.6	92.4	93	91.7
100	93.6	92.4	94.5	93.6	94.1	93	93	91.7
125	94.5	93.6	94.5	93.6	94.1	93	93.6	92.4
150	94.5	93.6	95	94.1	95	94.1	93.6	92.4
200	95	94.1	95	94.1	95	94.1	94.1	93
250	95.4	94.5	95	94.1	95	94.1	94.5	93.6
300	95.4	94.5	95.4	94s.5	95	94.1		
350	95.4	94.5	95.4	94.5	95	94.1		
400	95.4	94.5	95.4	94.5				
450	95.4	94.5	95.4	94.5				
500	95.4	94.5	95.8	95				

**Table 12-12
FULL-LOAD EFFICIENCIES FOR NEMA PREMIUM™ EFFICIENCY ELECTRIC MOTORS
RATED 600 VOLTS OR LESS (RANDOM WOUND)
OPEN MOTORS**

HP	2 POLE		4 POLE		6 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1	77	74	85.5	82.5	82.5	80

**Table 12-12
FULL-LOAD EFFICIENCIES FOR NEMA PREMIUM™ EFFICIENCY ELECTRIC MOTORS
RATED 600 VOLTS OR LESS (RANDOM WOUND)
OPEN MOTORS**

HP	2 POLE		4 POLE		6 POLE	
	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency	Nominal Efficiency	Minimum Efficiency
1.5	84	81.5	86.5	84	86.5	81.5
2	85.5	82.5	86.5	84	87.5	81.5
3	85.5	82.5	89.5	84	88.5	86.5
5	86.5	84	89.5	84	89.5	87.5
7.5	88.5	86.5	91	89.5	90.2	88.5
10	89.5	87.5	91.7	90.2	91.7	90.2
15	90.2	88.5	93	91.7	91.7	90.2
20	91	89.5	93	91.7	92.4	91
25	91.7	90.2	93.6	92.4	93	91.7
30	91.7	90.2	94.1	93	93.6	92.4
40	92.4	91	94.1	93	94.1	93
50	93	91.7	94.5	93.6	94.1	93
60	93.6	92.4	95	94.1	94.5	93.6
75	93.6	92.4	95	94.1	94.5	93.6
100	93.6	92.4	95.4	94.5	95	94.1
125	94.1	93	95.4	94.5	95	94.1
150	94.1	93	95.8	95	95.4	94.5
200	95	94.1	95.8	95	95.4	94.5
250	95	94.1	95.8	95	95.4	94.5
300	95.4	94.5	95.8	95	95.4	94.5
350	95.4	94.5	95.8	95	95.4	94.5
400	95.8	95	95.8	95	95.8	95
450	95.8	95	96.2	95.4	96.2	95.4
500	95.8	95	96.2	95.4	96.2	95.4

NOTES:

(Motor data for continuous duty, NEMA Design B, 1.15 service factor, 40 degrees Celsius ambient, Class F insulation, 3 phase, 460 volt, at listed speed rating.

(TEFC efficiencies apply to both horizontal and vertical motors.

2. Motors rated 50 horsepower or greater shall be individually tested at the factory before shipment, with a copy of test results provided for the Engineer, to assure compliance with the efficiency and power factor specifications.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Motors shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Motors shall be properly protected from weather hazards. Motors shall not be allowed to be wrapped tightly in plastic while outdoors. Motors delivered to the site which will not be put in service for a time more than 30 calendar days, whether in storage or installed, shall have the shafts rotated a minimum of five (5) rotations every 30 days.
- B. Motors provided with space heaters shall have temporary power applied to the heaters no later than 14 calendar days after delivery to the site until permanent power can be applied to the heaters.
- C. Motors that, in the opinion of the Engineer, have not been properly protected shall be inspected by the manufacturer's representative. Any required electrical corrections for testing shall be made at the Contractor's expense prior to acceptance and/or use.
- D. All motors shall operate without any undue noise or vibration and shall show no signs of phase unbalance.

3.03 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Witnessed Shop Tests
 - a. All motors shall be shop tested and inspected in accordance with the equipment manufacturer's standard procedures. Shop tests for motors 100 horsepower and larger may be witnessed by the Engineer. The manufacturer's testing and inspection procedures shall demonstrate that the equipment tested conforms to the requirements specified, all other applicable requirements, and shall be approved by the Engineer. At least 10 days' notice shall be given the Engineer prior to tests and inspection dates.
 - b. In addition to the efficiency and power factor testing specified herein, each motor shall be tested to determine compliance with the applicable requirements of the IEEE, ANSI and NEMA. Tests shall be as follows:
 - 1) Motors less than 50 HP:

- a) Each motor shall be subjected to a standard, short commercial test including the following:
 - i. Running current, no load
 - ii. Locked rotor current
 - iii. High potential
 - iv. Winding resistance
 - v. Bearing inspection
- 2) Motors between 50 and 100 HP
 - a) Each motor shall be subjected to the above tests and shall be furnished with certified test results.
- 3) Motors larger than 100 HP
 - a) Each motor shall be furnished with certified test results. Each motor shall be subjected to a complete test consisting of full load heat run, percent slip, running load current, locked rotor current, breakdown torque (calculated), starting torque, winding resistance, high potential, secondary current and voltage at collector rings (wound rotor), efficiencies at 100, 75 and 50 percent of full load, power factors at 100, 75 and 50 percent of full load and bearing inspection. Tests will be witnessed by the Engineer where specifically indicated.
- 4) Test Reports
 - a) All test results for motors over 100 horsepower shall be submitted to the Engineer for approval. Copies of witnessed test raw data shall be submitted to the Engineer immediately upon completion of such tests.

2. Field Tests

- a. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 01, and Section 26 05 00 - Basic Electrical Requirements.
- b. All electric motors furnished for this project one (1) horsepower or larger shall have the information required in the following tabulation completed. See Exhibit "A" on following page.
- c. All field testing shall be witnessed by the Engineer.

END OF SECTION

SECTION 26 09 16
ELECTRIC CONTROLS AND RELAYS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, test, and place in satisfactory operation all electric controls and relays as specified herein and indicated on the Drawings.
- B. Electrical control and relay systems shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 53 – Identification for Electrical Systems.

1.02 CODES AND STANDARDS

- A. Products specified herein shall be in conformance with or listed to the following standards as applicable:
 - 1. NEMA 250 – Enclosures for Electrical Equipment
 - 2. UL 508A – Standard for Industrial Control Panels
 - 3. UL-1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - 4. ANSI/ISA 12.12.01-2013 – Nonincendive Electrical Equipment for use in Class I and II, Division 2 Hazardous (Classified) locations.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Spare Parts List
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor. In addition to the manufacturer recommended spare parts, the following spare parts shall be provided for the local control stations:
 - 1. One (1) contact block of each type furnished on the project
 - 2. One (1) indicating light lens of each color furnished on the project
 - 3. One (1) LED lamp of each color furnished on the project
- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

PART 2 – PRODUCTS

2.01 CONTROL COMPONENTS

A. Manufacturers

1. Control components shall be manufactured by Eaton, The Square D Company, General Electric, Allen-Bradley, Siemens Energy and Automation, or Engineer approved equal.

B. Pilot Devices

1. General

- a. All pilot devices shall be provided with a legend plate. Legend plates shall have a white background and black lettering and indicate the function of the respective pilot device. The text shown on the Drawings or indicated in the specifications shall be used as the basis for legend plate engraving (e.g., HAND-OFF-AUTO, RUN, EMERGENCY STOP, etc.).
- b. All pilot devices shall be selected and properly installed to maintain the NEMA 250 rating of the enclosure in which they are installed. All pilot devices shall be UL 508 Listed.
- c. All pilot devices shall be 30.5mm in diameter, unless otherwise indicated. 22mm devices are not acceptable.
- d. Pilot devices for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.
- e. In Class 1 Division 2 hazardous locations, pilot devices shall be the hermetically sealed type, constructed in accordance with ANSI/ISA 12.12.01.

2. Pushbuttons

- a. Pushbuttons shall be non-illuminated, black in color, and have momentary style operation unless otherwise indicated on the Drawings.
- b. Pushbuttons shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each pushbutton. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

- c. Pushbuttons shall be provided with a full guard around the perimeter of the button. Where a lockout style pushbutton is specified or indicated on the Drawings, provide a padlockable guard.

3. Selector Switches

- a. Selector switches shall be non-illuminated, black in color, and have the number of maintained positions as indicated on the Drawings and as required. Handles shall be the extended type that provide a greater surface area for operation.
- b. Selector switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each selector switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.
- c. Where indicated in the Drawings or Specifications, provide spring return positions.
- d. Selector switches shall be provided with an indexing component that fits into the keyed portion of the cutout for the device and prevents the switch from spinning when operated.

4. Indicating Lights

- a. Indicating lights shall be LED type, with the proper voltage rating to suit the application, and push-to-test feature.
- b. Indicating light lens colors shall be as required in equipment specifications and/or as indicated on the Drawings. If lens colors are not indicated, the following colors shall be used:

Color	Designation
Red	"Run", "On", "Open"
Green	"Off", "Closed"
Amber	"Alarm", "Fail"
White	"Control Power On"

5. Emergency Stop and Tagline Switches

- a. Emergency stop switches shall be non-illuminated, red in color, with a minimum 35mm diameter mushroom head. Once activated, switch shall maintain its position and require a manual pull to release/reset.
- b. Tagline switches shall have a plunger that activates upon tension from the associated safety cable. Once activated, switch shall maintain its position and require a manual release/reset.
- c. Emergency stop and tagline switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

C. Relays and Timers

1. General

- a. Control relays and timers shall be furnished with an integral pilot light for positive indication of coil energization.
- b. Relays and timers for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.

2. Control and Pilot Relays

- a. Relays shall have a clear or translucent housing that allows the contacts to be visually inspected without disassembly.
- b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.
- c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have 3-pole, double-throw (3PDT) contact arrangement.

3. Time Delay Relays

- a. Timers delay relays shall utilize electronic timing technology. Mechanical timing devices are not acceptable.
- b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.

- c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have double-pole double-throw (DPDT) contact arrangement.
 - d. Time delay ranges shall be as indicated on the Drawings and/or as required to suit the application. Timing range shall be adjustable from the front of the relay. On delay and off delay timer configurations shall be provided as indicated on the Drawings and/or as required to suit the application.
4. Elapsed Time Meters
- a. Elapsed time meters shall be non-resettable type with no less than a 6-digit display. Coil voltage shall be as required to suit the application and/or as indicated on the Drawings.

D. Control Terminal Blocks

- 1. Control terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails securely bolted to the enclosure or subpanel. Terminals shall be tubular screw type with pressure plate that will accommodate wire size range of #22 – #8 AWG.
- 2. Control terminal blocks shall be single tier with a minimum rating of 600 volts and 20A. Separate terminal strips shall be provided for each type of control used (i.e., 120VAC vs. 24VDC). Quantity of terminals shall be provided as required to suit the application. In addition, there shall be enough terminals for the termination of all spare conductors.
- 3. Terminals shall be marked with a permanent, continuous marking strip, with each terminal numbered. One side of each terminal shall be reserved exclusively for incoming field conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

2.02 LOCAL CONTROL STATIONS

- A. Local control stations shall be furnished and installed complete with pushbuttons, selector switches, indicating lights, and other devices as indicated on the Drawings.
- B. Specific devices installed in local control stations shall be provided in accordance with the requirements specified elsewhere in this Section.
- C. In non-hazardous locations, local control stations shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Die Cast Zinc
Indoor Dry Non-process Area	NEMA 12, Die Cast Zinc
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, Fiberglass or Thermoplastic Polyester
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Type 304 Stainless Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

- D. In hazardous locations, local control stations shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 4X, Type 304 Stainless Steel
Class II, Division 1, Group F	NEMA 9, Die Cast Aluminum
Class II, Division 2, Group F	NEMA 9, Die Cast Aluminum

- E. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs. Conduit hubs shall be external to the enclosure.
- F. Local control stations for use in non-hazardous locations shall be UL-508 Listed. Local control stations for use in Class I Division 1 and Class II Divisions 1/2 hazardous locations shall be UL-1203 Listed. Local control stations for use in Class I Division 2 hazardous locations shall be in accordance with ANSI/ISA 12.12.01-2013.
- G. Provide a nameplate on each local control station in accordance with Section 26 05 53 – Identification for Electrical Systems. The name and/or number of the equipment associated with each control station shall be engraved on the nameplate, followed by the words “LOCAL CONTROL STATION”.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Local control stations shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.
- B. All control components shall be mounted in a manner that will permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component's mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices.
- C. Pilot devices shall be properly bonded to the equipment enclosure door where they are installed. If proper bonding cannot be achieved through the locknuts that affix the device in place, a green colored bonding screw shall be provided on the pilot device. The device shall be bonded to the equipment enclosure with an insulated green bonding conductor.
- D. Local control station covers shall be bonded to the local control station enclosure with an insulated green bonding conductor.
- E. Wiring to devices at each local control station shall be provided with enough slack to permit the local control station cover to be removed and pulled at least 6 inches away from the enclosure.
- F. Terminal strips, relays, timers, and similar devices shall not be installed on the rear of the panel/cabinet doors. Terminal strips, relays, timers, and similar devices shall not be installed on the side walls of panel/cabinet interiors without written permission from the Engineer.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all switches, and receptacles as shown on the Drawings.
- B. All switches and receptacles shall be furnished and installed in outlet boxes. Reference Section 26 05 33.16 – Boxes for Electrical Systems for outlet box requirements.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 19 – Low-Voltage Conductors and Cables.

1.02 CODES AND STANDARDS

- A. Wiring devices shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 20 – General Use Snap Switches
 - 2. UL 498 – Standard for Attachment Plugs and Receptacles
 - 3. UL 943 – Ground Fault Circuit Interrupters
 - 4. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include, but not be limited to:

1. Product data sheets.

1.05 SPARE PARTS

- A. The Contractor shall furnish 10% (minimum of 1) spare of each receptacle, switch, and plug furnished and installed for this project.
- B. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size shall have the same parts number.

1.06 IDENTIFICATION

- A. Each switch and receptacle shall be identified with the equipment item number, manufacturer's name or trademark, and such other information as the manufacturer may consider necessary, or as specified, for complete identification.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by these Specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. The Contractor shall use the products of a single manufacturer for each type of wiring device.
- C. The Contractor shall use the products of a single manufacturer for all device plates. Plate variations are allowed for the following devices:
 1. Where the selected plate manufacturer does not manufacture a suitable finish plate.
 2. For heavy-duty receptacles rated at more than 30A.
 3. Where non-standard plates are required, specified, or shown.
- D. The Contractor shall furnish and install all wiring devices and device plates.

- E. In non-hazardous areas, provide specification grade devices manufactured by Appleton, Crouse-Hinds, Leviton, Hubbell, Pass & Seymour, or Engineer approved equal.
- F. In hazardous areas, provide devices manufactured by Appleton, Cooper Crouse-Hinds, Hubbell-Killark, or Engineer approved equal.

2.02 WIRING DEVICES

- A. Wall switches for non-hazardous areas shall be rated for the current required to suit the application, but not less than 20A. Double pole, three-way, and four-way switches shall be provided where indicated on the Drawings, and as required. Switches shall be rated for 120-277VAC and shall be UL 20 Listed.
- B. Convenience receptacles for non-hazardous areas shall be rated for 20A at 125VAC and shall be UL 498 Listed. Receptacles shall be weather resistant where installed in wet or damp locations.
- C. Special purpose receptacles (welders, lab equipment, etc.) shall be provided with the proper NEMA configuration and ampacity as indicated on the Drawings. The coordinating plug for each special purpose receptacle shall be provided with the equipment which it is serving.
- D. Ground fault circuit interrupter receptacles shall be rated for 20A at 125VAC and shall be UL 943 Listed. Receptacles shall be weather resistant where installed in wet or damp locations.
- E. Wall switches for hazardous areas shall be the factory sealed type, UL 1203 Listed for use in the hazardous area. Wall switches shall be rated for 120-277VAC, and shall be rated for the current required to suit the application, but not less than 20A
- F. Receptacles for hazardous areas shall be rated 20A at 120-240VAC. Receptacles shall be UL 1203 listed for use in the hazardous area, utilizing delayed-action construction.
- G. All wiring devices shall be approved for use with stranded conductors, if stranded conductors are to be used with the device. Reference Section 26 05 19 – Low-Voltage Conductors and Cable for conductor requirements

2.03 DEVICE PLATES

- A. Device plates for indoor flush-mounted receptacles and switches shall be made of Type 304 stainless steel, not less than 0.032 of an inch thick, with beveled edges and milled on the rear so as to lie flat against the wall. Devices plates shall be provided with a gasket.
- B. Device plates for outdoor installations, indoor wet process areas, and chemical storage/transfer areas shall be Appleton Type FSK, Crouse-Hinds #DS185, or equal for wall switches. Device plates for receptacles shall be “in-use” style. “In-use”

weatherproof covers shall be rugged, minimum 3 ¼" depth, die-cast aluminum as manufactured by Thomas & Betts "Red Dot," Intermatic International, Inc., or equal.

- C. Device plates for indoor dry process and non-process areas with surface mounted boxes shall be Crouse-Hinds DS32, or equal for switches, and Crouse-Hinds DS23 or equal for receptacles.

2.04 PLUGS

- A. The Contractor shall furnish suitable plugs with equipment furnished under the respective Specification Section. Plugs shall be black rubber or plastic. For waterproof receptacles, the plugs shall be similar in construction to the receptacles and shall be encased in corrosion resistant yellow housing provided with clamping nuts and stuffing gland cable outlets.

2.05 PROCESS INSTRUMENTS

- A. The Contractor shall furnish and install a local disconnect switch at each process instrument (e.g., level transmitter, flow transmitter, analytical instrument etc.,) to disconnect the 120VAC power supply to the instrument. The device shall be a NSSC series manual motor starting switch without overload protection as manufactured by Crouse-Hinds, Appleton equivalent, or equal. For hazardous locations, the device shall be UL 1203 Listed.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Where more than one (1) switch occurs at one (1) location, gang plates shall be used.
- B. All device plates shall be set true and plumb and shall fit tightly against the finished wall surfaces and outlet boxes.
- C. Wiring device box (outlet box) mounting heights shall be as specified in Section 26 05 33.16 – Boxes for Electrical Systems.
- D. When indicated height would place any of the equipment at an unsuitable location such as at a molding or break in wall finish, the Contractor shall bring it to the attention of the Engineer for a decision.
- E. Receptacles installed in toilet, locker, and bathrooms, and within 6 feet of a sink, shall be of ground fault interrupter type. Ground fault circuit interrupter receptacles shall also be furnished and installed in additional locations where indicated on the Drawings, and as required by the NEC.

- F. All receptacles shall have a self-adhesive label installed on the top at the respective device plate that indicates which panel and which circuit number the receptacle is supplied from. Labels shall have a white background and black lettering in 14-point font.

3.02 CIRCUITING

- A. Convenience receptacles shall be grouped on circuits separate from the lighting circuits. A maximum of eight (8) convenience receptacles are permitted per 20A, 120V circuit, unless otherwise indicated on the Drawings.

END OF SECTION

SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install separately mounted, individual disconnect switches as specified herein and indicated on the Drawings.
- B. Disconnect switches for process instruments are not included in the scope of this Section and shall be as specified in Section 26 27 26 – Wiring Devices.
- C. Reference Section 26 05 00 – Basic Electrical Requirements and Section 26 05 53 – Identification of Electrical Systems.

1.02 CODES AND STANDARDS

- A. Disconnect switches shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. UL 98 – Enclosed and Dead-Front Switches
 - 2. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - 3. NEMA 250 – Enclosures for Electrical Equipment
 - 4. NEMA KS 1 – Heavy Duty Enclosed and Dead-Front Switches

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
 - 2. Spare Parts List
 - 3. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets.
 - 2. Complete layout and installation drawings with clearly marked dimensions for each type/size/rating of disconnect switch.
 - 3. Assembled weight of each unit.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

- A. The equipment shall be furnished with all spare parts as recommended by the equipment manufacturer.
- B. One (1) complete set of spare fuses for each ampere rating installed shall be furnished and delivered to the Owner at the time of final inspection.
- C. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- D. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.06 IDENTIFICATION

- A. Each equipment item shall be identified with a nameplate. The nameplate shall be engraved indicating the circuit number and equipment name with which it is associated. Equipment identification shall be in accordance with Section 26 05 53 – Identification for Electrical Systems.

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PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. Switches shall be manufactured by the Square D Company, Eaton, the General Electric Company, or Siemens Energy and Automation, Inc.

2.02 DISCONNECT SWITCHES

- A. Disconnect switches shall be heavy-duty type and/or as specified in these Specifications. Switches shall be furnished and installed as shown on the Drawings and as required by the NEC. Handles shall be lockable.
- B. Disconnect switches for non-hazardous areas shall be UL 98 Listed. Disconnect switches for hazardous areas shall be UL 1203 Listed.
- C. Switches shall meet NEMA Standard KS 1 type HD requirements, be, single-throw, be externally operated, and be fused or non-fused as indicated on the Drawings. Switches shall have the number of the poles, voltage, and ampere ratings as shown on the Drawings.
- D. Enclosure Types and Materials
 - 1. In non-hazardous locations, disconnect switches shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Painted Steel
Indoor Dry Non-Process Area	NEMA 1, Painted Steel
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, Fiberglass
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Type 304 Stainless Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

2. In hazardous locations, disconnect switches shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

Area Classification	Enclosure Type and Material
Class I, Division 1, Group D	NEMA 7, Die Cast Aluminum
Class I, Division 2, Group D	NEMA 7, Die Cast Aluminum
Class II, Division 1, Group F	NEMA 9, Die Cast Aluminum
Class II, Division 2, Group F	NEMA 9, Die Cast Aluminum

3. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs.
 4. Where located outdoors or in indoor wet process areas, NEMA 7 and NEMA 9 enclosures shall also carry a NEMA 4X rating.
- E. Disconnect switches shall be quick-make, quick-break and with an interlocked cover which cannot be opened when switch is in the "ON" position and capable of being locked in the "OPEN" position.
 - F. A complete set of fuses for all switches shall be furnished and installed as required. Time-current characteristic curves of fuses serving motors or connected in series with circuit breakers shall be coordinated for proper operation. Fuses shall have voltage rating not less than the circuit voltage.
 - G. Disconnect switches shall be furnished with a factory installed internal barrier kit that helps prevent accidental contact with live parts and provides "finger-safe" protection when the door of the enclosed switch is open.
 - H. Disconnect switches shall be furnished with a manufacturer-supplied ground lug kit for termination of equipment grounding conductors. Where a grounded (neutral) conductor is shown on the Drawings in the conduits connected to the disconnect switch, a manufacturer-supplied neutral bar shall be furnished for termination of the grounded conductors. Third party ground lug and neutral lug kits not supplied by the disconnect switch manufacturer are not acceptable.
 - I. Fused disconnect switches shall be furnished for motor operated valve and gate actuators where shown on the Drawings. The Contractor shall coordinate the supply of these fused switches with the specific requirements of the actuator. Fuses with fast fault clearing times may be required for modulating valve actuators.

- J. Disconnect switches for all motors connected to variable frequency drives (VFDs) shall be furnished with a factory installed electrical interlock kit that includes one (1) early-break auxiliary contact rated for 5A (minimum) at 120 VAC to be used to open the control circuit before the main switch blades break.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All disconnect switches shall be mounted five (5) feet above the floor or finished grade, at the equipment height where appropriate, or where shown otherwise.
- B. Disconnect switches shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 - 1. Field Tests
 - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.

END OF SECTION

SECTION 26 43 13
SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, and place in satisfactory operation, the surge protective devices (SPD) as specified herein and indicated on the Drawings.
- B. Reference Section 26 05 19 – Low-Voltage Conductors and Cables, and Section 26 05 53 – Identification for Electrical Systems.

1.02 CODES AND STANDARDS

- A. The surge protective device shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. Underwriters Laboratories, Inc. (UL)
 - a. UL1449, latest edition: Surge Protective Devices
 - b. UL1283, latest edition: Electromagnetic Interference Filters
- B. American National Standards Institute (ANSI)/Institute of Electrical & Electronic Engineers (IEEE)
 - 1. C62.41.1: 2002 Guide for Surge Voltages in Low-Voltage AC Power Circuits
 - 2. C62.41.2: 2002 Recommend Practice on Characterization of Surges in Low Voltage (100V and Less) AC Power Circuits.
 - 3. C62.45: 2002 IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits
 - 4. C62.62: 2000 IEEE Standard Test Specifications for Surge Protective Devices for Low Voltage (1000V and Less) AC Power Circuits

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings

2. Operation and Maintenance Manuals
3. Spare Parts List

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for re-submittal.
- C. Drawings submitted by the manufacturer shall be complete and documented to provide the Owner with operations and maintenance capabilities.
- D. Shop drawings for each SPD shall include but not be limited to:
 1. A Compliance, Deviations, and Exceptions (CD&E) letter. If the shop drawings are submitted without this CD&E letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this Specification Section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.
 2. Product Data Sheets.
 3. Detailed drawings showing weights and dimensions.
 4. Wiring diagrams showing field connections.
 5. Proof that all products provided under this Section are UL listed and labeled by Underwriters Laboratories to UL1449, latest Edition. This proof shall be a copy of the data listed under the UL File Number for the manufacturer, which may be obtained from the UL Online Certification Directory. No other means of proving compliance (such as manufacturer data sheets, marketing material, etc.) will be considered acceptable.
 6. Proof of Short Circuit Current Ratings (SCCR), Voltage Protection Ratings (VPRs) for all modes, Maximum Continuous Operating Voltage rating (MCOV), Nominal

Discharge Current (In), and device listing Type shall be submitted using the same means as described in the paragraph above.

7. Proof that all products provided under this Section are UL listed and labeled by Underwriters Laboratories to UL 1283, latest Edition. This proof shall be a copy of the data listed under the UL File Number for the manufacturer, which may be obtained from the UL Online Certification Directory. No other means of proving compliance (such as manufacturer data sheets, marketing material, etc) will be considered acceptable.

8. Manufacturer's Warranty Information

- E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "Soft Cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

- A. All spare parts as recommended by the equipment manufacturer shall be furnished by the Contractor to the Owner.
 - B. The Contractor shall furnish one (1) spare field replacement module of each rating provided under this Contract.
 - C. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
 - D. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.
 - E. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
 - F. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

1.07 IDENTIFICATION

- A. Each SPD shall be identified by the circuit number and equipment name as indicated on the Drawings. A nameplate shall be securely affixed in a conspicuous place on each SPD. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

- A. All SPDs, associated hardware, and supporting components shall be warranted to be free from defects in materials and workmanship, under normal use and in accordance with the instructions provided, for a period of five (5) years after acceptance of the equipment by the Owner.
- B. Any component or subassembly contained within the surge protection system that shows evidence of failure or incorrect operation during the warranty period, shall be replaced by the manufacturer at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 GENERAL

- A. The SPD units shall be UL 1449 Listed and must bear the UL mark. Units that are “manufactured in accordance with” UL 1449 or tested by other testing agencies “in accordance with” UL 1449 are not acceptable and will be rejected.
- B. Type II SPD units shall be UL 1283 Listed and must bear the UL mark. Units that are “manufactured in accordance with” UL 1283 or tested by other testing agencies “in accordance with” UL 1283 are not acceptable and will be rejected. Further, SPD units using UL 1283 capacitors but not tested to UL 1283 will be rejected.

2.02 PRODUCTS

- A. Type I surge protective devices (SPD) shall be furnished and installed when shown without upstream overcurrent protection on the Drawings. Type II SPDs shall be provided in all other locations. Type II SPDs shall not require the use of a specific upstream overcurrent device. SPDs shall be provided in the location and quantity as shown on the Drawings.
- B. Each SPD shall be rated for the voltage and configuration of the equipment to which it is connected.
- C. Each Type II SPD shall have UL 1283 EMI/RFI filtering with minimum attenuation of -50dB at 100kHz.

- D. The short circuit current rating of each SPD shall match or exceed the rating of the equipment to which it is connected. The Contractor shall reference the Drawings for short circuit current rating of each piece of equipment.
- E. Each SPD system shall provide surge protection in all possible modes. Surge protection shall be as follows:

System Configuration	Modes of Protection	Number of Modes
3-Phase Wye	L-N, L-G, N-G	7
3-Phase Delta	L-L, L-G	6
3-Phase Impedance Grounded	L-L, L-G	6
Single-Phase	L-N, L-G, N-G	3

- F. Each SPD shall have a Maximum Continuous Operating Voltage (MCOV) of at least 115% of the nominal voltage of the equipment to which it is connected.
- G. The Nominal Discharge Current (In) of each SPD shall be 20kA. Peak surge current ratings shall not be used as a basis for applying the SPD to the system.
- H. The Voltage Protection Rating (VPR) of each SPD shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
208Y/120	800V	800V	1200V	800V
480Y/277	1200V	1200V	1800V	1200V
480 DELTA	N/A	1800V	1800V	N/A
240 DELTA	N/A	1200V	1200V	N/A
120/240	800V	800V	1200V	800V

- I. The surge current rating for each SPD shall be as indicated on the Drawings. Surge current ratings are indicated on single line diagrams and in panel schedules. Surge current rating indicated is on a per phase basis.
- J. SPDs which are indicated to be installed externally mounted from the equipment that they protect shall be provided within a separate enclosure. The enclosure shall match or exceed the NEMA rating of the enclosure for the equipment that it is serving (i.e. NEMA1, NEMA 12, NEMA 4X, etc.).
- K. Each SPD shall be provided with the following accessories:

1. Each individual module shall feature an LED indicating the individual module has all surge protection devices active. If any single component is taken off-line, the LED shall turn off and another LED shall illuminate, providing individual module as well as total system status indication.
 2. Surge counter and audible alarm with reset/silence switch.
 3. One set of Form C (SPDT) dry contacts rated for at least 5A at 120VAC.
- L. SPDs which are indicated to be installed integral within the equipment that they protect shall be fabricated by the same manufacturer as the equipment that they serve. SPDs which are indicated to be installed externally mounted from the equipment that they serve shall be manufactured by Eaton, ASCO/Emerson Network Power, Current Technologies, General Electric, or Square D.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The SPD units shall be furnished and installed as shown on the Drawings and in accordance with the manufacturer's installation instructions
- B. SPDs which are indicated to be integral with the equipment that they protect shall be installed within the enclosure for that equipment.
- C. Externally mounted SPDs shall be installed as follows:
 1. The SPD units shall be mounted such that the conductor lengths are as short as possible, but no greater than 36 inches. Any installation resulting in a conductor length of greater than 36 inches shall be reviewed with the Engineer as a special type of cable may need to be installed. For equipment such as panelboards, the Contractor shall relocate the circuit breaker that is to be connected to the SPD as needed to achieve the shortest conductor length possible.
 2. The Contractor shall use a close nipple to enclose the conductors between the SPD and the equipment served. However, if due to field conditions a 90 degree conduit bend is required to connect the SPD to the equipment that it serves, the bend shall have a minimum radius of 36 inches to eliminate any potential for sharp bends in the conductors.
 3. Conductors between the equipment served and the SPD shall be 600V power wire and cable as specified in Section 26 05 19 – Low-Voltage Conductors and Cables. The individual conductors shall be gently twisted and sized as indicated on the Drawings.
- D. Prior to energizing, the following shall be performed for each SPD:

1. Verify that the SPD unit voltage and configuration is suitable for the system to which it is connected.
2. Verify that any Neutral to Ground bonding jumpers are installed as required.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:
 1. Shop Tests
 - a. Standard factory tests shall be performed on the equipment under this Section. All tests shall be in accordance with the latest version of NEMA, ANSI, and UL standards.
 - b. All surge protective devices, subassemblies, and components shall be 100% tested and certified by the manufacturer to meet their published performance parameters.
 2. Field Tests
 - a. None required.

END OF SECTION

SECTION 40 05 78.23

AIR/VACUUM VALVES FOR WASTEWATER SERVICE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install air/vacuum valves for wastewater service as shown and as specified herein, complete, and operable including all necessary accessories, all in accordance with the requirements of the Contract Documents.
- B. Valves shall comply with AWWA C512 titled "Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service".
- C. Coating shall comply with ANSI/AWWA C550 titled "Protective Interior Coatings for Valves and Hydrants".

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Not Used

1.03 SUBMITTAL

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Submittal shall include product information on the internal and external coatings.

PART 2 -- PRODUCTS

2.01 AIR/VACUUM VALVES FOR WASTEWATER SERVICE

- A. Function: Air/vacuum shall be specifically designed for operation on sewage (a.k.a. wastewater). The valve shall automatically provide the release of large volumes of air during pipeline filling. The valves will remain closed and will not reopen when the system is full and under positive pressure. The valves will open under negative pressure to admit large volumes of air during pipeline draining to prevent vacuum.
- B. Air Gap: Air/vacuum valve for wastewater service shall incorporate two stainless steel floats directly connected by a stainless-steel stem, to maintain an air gap between the bottom concave float and top shut-off float. The air gap shall prevent waste solids from fouling or clogging the top shut-off float.
- C. Removal of Internals: All valve internals shall be easily removed through the top cover without removing the main valve from the line.
- D. Body Material: Painted cast iron or ductile iron.
- E. Stem and Floats Materials: The stem, upper float and lower float shall be 316 stainless steel.

- F. Seals: Buna-N
- G. Manufacturer: APCO Series 401, or equal.
- H. Accessories: Air/vacuum valve manufacturer shall provide the following accessories for each air/vacuum valve:
 - 1. Inlet shut-off valve
 - 2. Blowoff valves for flushing
 - 3. Quick disconnect couplings
 - 4. Minimum 5' hose for flushing
 - 5. All other accessories needed for a complete and operable system
- I. Internal and Exterior Coatings: Coating shall be a fusion bonded epoxy that complies with AWWA Standard C550 (titled "Protective Epoxy Coatings for Valves and Hydrants"). The coatings be certified to the requirements of ANSI/ NSF Standard 61 -"Drinking Water System Components - Health Effects". Coating dry film thickness (DFT) shall be 12 to 20 mils.
- J. Valve Schedule:

Air/Vacuum Valve Schedule

Location	Inlet	Outlet	Discharge Air Flow in SCFM at 2 psi
Effluent Pump No. 3 Discharge	2" NPT	2" NPT	575

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. All valves shall be installed in accordance with the manufacturer's printed recommendations.

3.02 INSTALLATION

- A. The valve manufacturer shall furnish professionally printed installation and maintenance instruction manuals with each valve.

- END OF SECTION -

SECTION 40 73 13
PRESSURE AND DIFFERENTIAL PRESSURE GAUGES

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, test, install and place in satisfactory operation the pressure gauges, with all spare parts, accessories, and appurtenances as herein specified and as shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Not Used

PART 2 – PRODUCTS

2.01 PRESSURE GAUGES

- A. All gauges shall be designed in accordance with the ASME B40.1 entitled, "Gauges, Pressure, Indicating Dial Type - Elastic Element".
- B. All gauges shall be direct reading type. Snubbers shall be provided on all gauges. Gauge full-scale pressure range shall be selected such that the maximum operating pressure shall not exceed approximately 75% of the full-scale range.
- C. Features
 - 1. Mounting: ½" NPT, lower stem mount type
 - 2. Accuracy: 0.5% full scale
 - 3. Case: Solid front, black phenolic material
 - 4. Dial: White background and black letters
 - 5. Glass: Shatterproof
 - 6. Blow-out protection: Back
 - 7. Pressure element: stainless steel bourdon tube
 - 8. Movement: Stainless steel, Teflon coated pinion gear and segment
 - 9. Gaskets: Buna-N

- D. Liquid-filled or equivalent mechanically-damped gauges shall be used if the gauges are installed with pumps, or where gauges are subjected to vibrations or pulsation. Filling fluid shall be silicone unless oxidizing agents such as sodium hypochlorite are present, where halocarbon shall be used.
- E. Gauge size shall be 4-1/2".
- F. Diaphragm seals are required for this project.
- G. The complete gauge assembly and appurtenances shall be fully assembled and tested prior to field mounting. A 1/2" isolation stainless steel ball valve shall be provided for each gauge assembly.
- H. Pressure and vacuum gauges shall be Ashcroft Duragauge Model 1279, Ametek-U.S. Gauge Division, H.O. Trerice Co., WIKA Instrument Corporation, or equal.

PART 3 – EXECUTION

3.01 REQUIREMENTS

- A. Comply with manufacturer's installation instructions.

END OF SECTION

SECTION 43 20 00
PUMPS – GENERAL

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Comply with the requirements of Section 46 00 00 – Equipment General Provisions.
- B. The pumps shall be provided complete with all accessories, mountings, shims, sheaves, couplings, and other appurtenances as specified, and as may be required for a complete and operating installation.
- C. The provisions of this section shall apply to all pumps and pumping equipment specified except where specifically noted otherwise in the Contract Documents.
- D. All pumps provided under an individual specification section shall be by the same manufacturer unless otherwise indicated in the specification.
- E. All equipment for the pumps, including motors, cans and bases, shall be provided as a complete unit by the pump Manufacturer.
- F. The pump supplier shall have unit responsibility for coordinating the proper pump mounting system with the Contractor to ensure stable pump operation free from abnormal vibration.
- G. The pump supplier shall include, in his bid, time, labor, materials and tools required for installation assistance, testing and start-up with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. All equipment, materials, and installations shall conform to the requirements of the most recent editions with latest revisions, supplements, and amendments of the specifications, codes, and standards listed in Section 01 42 00 – References.
- B. Pumping system equipment, installation and testing shall be in accordance with the following applicable codes and standards. All standards shall be the latest version as of the date of project bidding.
 - 1. Hydraulic Institute
 - a. ANSI/HI 3.1-3.5 Rotary Pumps for Nomenclature, Definitions, Application and Operation
 - b. ANSI/HI 3.6 Rotary Pump Test

- c. ANSI/HI 9.6.1 Rotodynamic Pumps – Guideline for NPSH Margin
 - d. ANSI/HI 9.6.2 Rotodynamic Pumps for Assessment of Applied Nozzle Loads
 - e. ANSI/HI 9.6.3 Rotodynamic Pumps – Guideline for Operating Regions
 - f. ANSI/HI 9.6.4 Rotodynamic Pumps for Vibration Measurements and Allowable Values
 - g. ANSI/HI 9.6.5 Rotodynamic Pumps Guideline for Condition Monitoring
 - h. ANSI/HI 9.6.6 Rotodynamic Pumps for Pump Piping
 - i. ANSI/HI 9.6.8 Rotodynamic Pumps -Guideline for Dynamics of Pumping Machinery
 - j. ANSI/HI 9.8 Rotodynamic Pumps for Pump Intake Design
 - k. ANSI/HI 11.6 Rotodynamic Submersible Pumps for Hydraulic Performance, Hydrostatic Pressure, Mechanical and Electrical Tests
 - l. ANSI/HI 12.1-12.6 Rotodynamic Slurry Pump for Nomenclature, Definitions, Applications and Operation
 - m. ANSI/HI 14.1-14.2 Rotodynamic Pumps for Nomenclature and Definitions
 - n. ANSI/HI 14.3 Rotodynamic Pumps for Design and Application
 - o. ANSI/HI 14.6 Rotodynamic Pumps for Hydraulic Performance Acceptance Tests
2. American Society of Mechanical Engineers
 - a. ANSI/ASME B73.1 Specifications for Horizontal End Suction Centrifugal Pumps for Chemical Process
 3. American Petroleum Institute
 - a. ANSI/API Standard 610 Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
 4. American Water Works Association
 - a. ANSI/AWWA E103 Standard for Horizontal and Vertical Line-Shaft Pumps
 5. American Society for Testing and Materials
 - a. A36 Specification for Structural Steel

- b. A48 Specification for Gray Iron Castings
 - c. A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - d. A148 Specification for Steel Castings, High Strength, for Structural Purposes
 - e. A193 Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
 - f. A276 Specification for Stainless Steel Hot/Cold-Finished Bars
 - g. A322 Specification for Steel Bars, Alloy, Standard Grades
 - h. A514 Specification for High Yield Strength, Quenched and Tempered alloy Steel Plate, Suitable for Welding
 - i. A532 Specification for Abrasion-Resistant Cast Irons
 - j. A536 Specification for Ductile Iron Castings
 - k. A565 Specification for Martensitic Stainless Steel Bars
 - l. A582 Specification for Free-Machining Stainless and Heat-Resisting Steel Bar, Hot-Rolled and Cold-Rolled
 - m. A743 Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel and Nickel-Base, Corrosion-Resistant for General Application
 - n. B148 Specification for Aluminum-Bronze Sand Castings
 - o. B584 Specification for Copper Alloy Sand Castings for General Application
6. American National Standards Institute
- a. B16.1 Standard for Cast Iron Pipe Flanges and Flanged Fittings
 - b. B16.5 Standard for Pipe Flanges and Flanged Fittings
7. ANSI/NFPA 70 National Electric Code
8. Society of Automotive Engineers SAE J404 Chemical Compositions of SAE Alloy Steels
9. Standard, ISO 1940 – Mechanical Vibration – Balance quality requirements for rotors balance quality grade for rotors in a constant rigid state.

C. Related contract specification sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 46 00 00 – Equipment General Provisions
3. Section 43 21 47 – Vertical Turbine Pumps
4. Section 26 05 60 – Low Voltage Electric Motors

1.03 ACTION/INFORMATIONAL SUBMITTALS

A. Product Data:

1. Comply with Section 01 33 00 – Submittals.
2. Fabrication information

B. Provide submittals identified in Specification Section 46 00 00 – Equipment General Provisions in addition to the submittals identified herein and in addition to the submittals identified in the individual pumping specification sections.

C. Shop Drawings shall include the following information in addition to the requirements of Section 01 33 00 – Submittal Procedures and shall include the following information in addition to the requirements of Section 01 33 00 – Submittal Procedures:

1. Pump name, identification number and specification number.
2. Performance characteristics and descriptive data, including but not limited to pump performance curves at rated speed and reduced speeds (if reduced speeds are specified). Curves shall indicate flow, head, impeller diameter, efficiency, brake horsepower, and NPSH required. Curves shall identify minimum continuous stable flow (minimum flow to avoid suction recirculation), preferred operating region (POR) and allowable operating region (AOR) per the latest version of ANSI/HI 9.6.3. Performance curves submitted shall be for the entire pump assembly, including efficiency corrections and losses. Pump performance curves shall be submitted both in the form of performance data cut sheets and in tabular format. Tabular data shall include the following:
 - a. Flow
 - b. Pump Head
 - c. NPSH required
 - d. Pump Efficiency

- e. A minimum of 10 data points shall define rotodynamic pump performance curves listed above. Performance curve data points shall include the following:
 - 1) best efficiency point
 - 2) all specified operating points
 - 3) preferred operating range minimum and maximum
 - 4) allowable operating range minimum and maximum
 - 5) shutoff condition
 - 6) runout.
 - 7) The remainder of the points shall be distributed evenly to clearly define the shape of each of the curves.
 - 8) Each data point shall be reported to a minimum of three (3) significant figures.
 - 9) The curve data shall align with the HI acceptance grade (1B, 2B, 1U, etc.) as specified in the individual pump specification and shall explicitly state the applicable tolerance band, as defined by the Hydraulic Institute Standards, associated with each value.
3. Minimum submergence requirements shall be provided for vertically suspended pumps and submersible pumps.
4. Detailed dimensional drawings and setting plans including but not limited to:
 - a. General cutaway sections
 - b. Materials
 - c. Dimension of shaft projections
 - d. Shaft and keyway dimensions
 - e. Shaft diameter
 - f. Shaft-impeller connection details
 - g. Dimension between bearings
 - h. General dimensions of pump

- i. Suction head bolt orientation
 - j. Anchor bolt locations
 - k. Forces.
 - l. Assembly views
 - m. Provide weight of entire pump assembly, including motor and base weight of individual major subassemblies. Indicate the weight of each component, and total static and dynamic loads imparted by the equipment to the supporting structure.
 - n. Impeller
 - o. Drawings shall identify each component by tag number to which the catalog data and detail sheets pertain.
5. Drive and motor data as required by Division 26 – Electrical. Complete motor data shall include but not be limited to size, make, type and characteristics along with wiring diagrams. Where pump and motor speeds are to be regulated by variable speed drives, the CONTRACTOR shall coordinate, furnish and exchange all necessary requirements with the respective equipment manufacturers to ensure compatibility and shall submit pump, motor and variable speed drive shop drawings together as a complete system.
 6. Information on bearing types and bearing life.
 7. Gear box design and performance criteria and AGMA service factor.
 8. Equipment protective device details and connection diagrams.
 9. Details of shaft sealing system including seal/packing type, seal water control devices, and seal water piping schematic.
 10. Information on pump appurtenances including couplings, shaft guards, v-belt drive systems, etc.
 11. Submersible pump submittals shall also include:
 - a. Product data sheets for power and control cables, length of cables and cable support system.
 - b. Details on pump guide rail system and mounting requirements.
 - c. Minimum allowable pump submergence
 - d. Details on submersible pump's retrieval system.

- 12. Any additional information required to demonstrate compliance with the specifications.
- D. Results of structural, lateral, and torsional dynamic analyses as required herein and in the individual specification sections.
- E. Shipment, Delivery, Handling and Storage instructions.
- F. Installation instructions.
- G. Manufacturers literature and brochures
- H. Lubrication Information: Complete lubrication instructions and lubricant schedule, including manufacturer's recommended lubricant. All lubricants shall be food grade, NSF 61 approved. Schedule shall include frequency of lubricant application, type of lubricant, and instructions regarding lubricant application
- I. Materials of construction and associated specifications (such as AISI, ASTM, SAE, etc.), including grade and type.
- J. Coatings: Coating system data and description of coating system, surface preparation and shop painting, including certification that the shop paint is compatible with the finish paint. Finish painting shall be by the manufacturer.

1.04 CLOSEOUT SUBMITTALS

- A. Submit warranty documentation in compliance with:
 - 1. Section 01 33 00 – Submittals
 - 2. Section 01 61 00 – Product Requirements and Options
 - 3. Section 01 75 00 – Checkout and Startup Procedures
- B. Operation and Maintenance (O&M) manuals shall be submitted in accordance with Section 01 33 00 – Submittal Procedures and Section 01 78 23 – Operation and Maintenance Data.

1.05 MAINTENANCE MATERIALS SUBMITTALS

- A. Operation and Maintenance (O&M) manuals shall be submitted in accordance with:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 78 23 – Operation and Maintenance Data.
- B. Comply with Section 01 79 00 – Instructions to Owner's Personnel.

- C. Comply with Section 46 00 00 – Equipment General.

1.06 QUALITY ASSURANCE SUBMITTALS

- A. Factory testing plan.
- B. Factory Test Results shall be submitted and approved prior to shipment of equipment.
- C. Field testing plan.
- D. Comply with Section 01 75 00 – Check Out and Start Up Procedures.
- E. Preliminary field test data.
- F. System field quality control testing
- G. Final field test data.
- H. Certified test reports
- I. Startup report including data substantiation of successful completion of 30-day operational demonstration performance data.

1.07 GENERAL INFORMATION AND DESCRIPTION

- A. Comply with Section 46 00 00 – Equipment – General Provisions.

1.08 DYNAMIC ANALYSIS

- A. Not Used.

1.09 WARRANTY

- A. Warranty requirements shall be as specified in Section 01 61 00 – Product Requirements and Options. Warranty requirements are supplementary to the individual equipment specifications.
- B. Comply with the Equipment Warranties requirements specified in Section 46 00 00 – Equipment General Provisions.

1.10 OPERATING CONDITIONS AND PERFORMANCE REQUIREMENTS:

- A. When operating at the maximum output speed each pump shall have a characteristic performance curve which meets the conditions listed in the pump schedule. The pumps and drive motors shall be capable of operating satisfactorily under the full-range of speed, flow and pressure conditions as defined by the pump schedule. Pump efficiency as defined herein shall include all mechanical losses from bearings and shaft seals.

- B. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine run-away speed of the unit due to backflow through the pump with the primary TDH specified available at the pump discharge flange. Maximum reverse run-away speed shall not exceed 130 percent of the design operating speed.
- C. Pump manufacture shall certify a Minimum Continuous Stable Flow (MCSF) rating at maximum speed that is lower than the specified minimum operating flow. Where a reduced speed operating condition is specified, the manufacturer shall also certify MCSF at the pump speed required to meet this condition.
- D. Factory test acceptance grade for rating point shall be as specified herein, except where superseded via specification and/or scheduled values in the individual pump specifications, however power required shall not exceed the rated motor horsepower.
- E. Pump Operating Conditions: Refer to respective individual pump specifications for specific performance requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Performance Curves: All centrifugal pumps shall have a continuously rising curve. In no case shall the required horsepower at any point on the performance curve exceed the rated horsepower of the motor or drive. Safety factors will not be considered in determining compliance with this requirement.
- B. Suction and discharge flanges shall conform to ASME B16.1 or B16.5 dimensions.
- C. For pumps in raw sewage service and as required by individual pump specifications, handholes shall be provided on the pump suction nozzle and the pump volute and shall be shaped to follow the contours of the casing or adjoining piping to avoid any obstructions in the water passage.
- D. The minimum ABMA L10 bearing life for all pump, motor and drive bearings shall be 60,000 hours unless otherwise specified in the individual pump specification sections.

2.02 ANCHORS AND SUPPORTS

- A. Comply with the following Specification Sections:
 - 1. Specification Section 05 05 23 – Metal Fastening.
 - 2. Specification Section 46 00 00 – Equipment General Provisions.
 - 3. Comply with individual pump specifications.

- B. Comply with ACI 351.3R-04 – Foundations for Dynamic Equipment.

2.03 DEFAULT MATERIALS

- A. Pumps shall be constructed out of the materials specified in respective individual pumping specification sections. Material not specifically called for shall be high-grade, standard commercial quality, free from all defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements unless otherwise specified in individual pumping equipment Specifications:

Component	Material
Casings and Bowls	Close-grained gray cast iron, conforming to ASTM A 48, or equal
Impellers	ASTM B 148, aluminum bronze
Shafts, wetted	Type 400 series stainless steel
Shafts, non-wetted	AISI 4140 steel
Miscellaneous stainless steel parts	Type 316 series stainless steel
Anchor Bolts and Fasteners	Type 316 stainless steel

2.04 COMPONENTS:

- A. Refer to individual specification sections for specific requirements.
- B. Pump Shaft:
 1. The shaft shall be heat treated, turned, ground, and polished over its entire length and shall be provided with keyways on both ends.
 2. Shall be sufficiently large in diameter to safely transmit the maximum torque developed by the drive unit and provide a rigid support for the impeller to prevent excessive vibration.
- C. Bearings:
 1. Bearings shall be designed for continuous heavy duty loads and for both axial and radial thrust loads.
 2. The specified ABMA L-10 life for bearings shall be under worst possible operating conditions.
 3. Bearings shall support the shaft and the complete rotating elements.

2.05 STRUCTURAL STEEL

- A. Not used.

2.06 DISSIMILAR METALS

- A. Not used.

2.07 GALVANIZING

- A. Not used.

2.08 STANDARDIZATION OF GREASE FITTINGS

- A. Grease Fittings: Comply with Section 46 00 00 – Equipment General Provisions.

2.09 APPURTENANCES

- A. Seals:

1. Mechanical seals shall be furnished as specified in individual pumping equipment sections.
2. If the pump manufacturer recommends a better seal or alternate flushing arrangement for a specific application, it may be submitted to the Engineer for approval in accordance with the requirements of Section 01 25 00 – Substitution Procedures.

- B. Pressure Gauges:

1. Contractor shall supply all pressure gauges for all pumps by one manufacturer.
2. Gauges shall be provided through the instrumentation subcontractor to match other gauges on the project.
3. Gauges shall be as specified in Section 40 73 13 – Pressure and Differential Pressure Gauges.
4. The Contractor shall furnish and install pressure gauges as shown on the Drawings, but the following gauges shall be provided as a minimum:
 - a. On the suction and discharge of each pump, except wet-pit submersible pumps and vertical turbine pumps.
 - b. On the discharge piping of each wet-pit submersible pump and vertical turbine pump in the locations shown on the Drawings or as directed by the Engineer.

5. Gauge ranges shall be coordinated with the pump manufacturer and shall meet the following requirements, except where otherwise specified:

Location	Type	Graduation	Suction Range	Discharge Range
Suction	Single Scale, Compound	FT H20	-34-FT	+34-FT
Discharge	Single Scale	FT H20	0-FT	Greatest of the following: - Shutoff + 5-FT - 130% of Maximum

C. Shaft Couplings:

1. Except as otherwise specified in individual pump specification sections, flexible couplings for direct driven pumps shall be as manufactured by Falk, Dodge, Woods Corp., or equal and shall be furnished with guards in accordance with OSHA Rules and Regulations.
2. Spacer couplings shall be provided where necessary to allow removal of the pump rotating element without disturbing the driver.
3. Comply with Section 46 00 00 – Equipment General Provisions protective guard requirements.

D. Equipment Guards: Provide guards in accordance with OSHA requirements for all rotating assemblies that would otherwise be exposed at the operating deck level.

E. Provide access to:

1. Couplings
2. Oil drains

2.10 ELECTRICAL REQUIREMENTS

- A. All electrical equipment and appurtenances, including but not limited to motors, panels, conduit and wiring, etc., specified in the equipment specifications shall comply with the applicable requirements of the Division 26 specifications and the latest National Electric Code.
- B. All pumps shall be furnished with motors such that the motor shall not be overloaded throughout the full range of the pump operation. The use of service factor will not be allowed in determining overloaded condition.
- C. In the individual pump specifications, specified motor horsepower is intended to be the minimum size motor to be provided. If a larger motor is required to meet the specified operating conditions and performance requirements, the Contractor shall furnish the

larger sized motor and shall upgrade the electrical service (conduit, wires, starters, etc.) at no additional cost to the Owner.

- D. Where variable frequency drives (VFDs) are specified, the Contractor shall be responsible for coordinating between pump supplier and VFD supplier to ensure a complete and operational system. VFDs shall be furnished under Division 26 unless otherwise specified in the pump specification.
- E. Motor starters and controls shall be furnished and installed under Division 26 and Division 40 unless otherwise specified in the individual pump specifications.

2.11 EQUIPMENT IDENTIFICATION

- A. Comply with the requirements of Section 46 00 00 – Equipment General Provisions.
- B. All pumps shall be provided with a substantial stainless steel nameplate, mechanically fastened with stainless steel hardware in a conspicuous place, and clearly inscribed with:
 - 1. the manufacturer's name
 - 2. year of manufacture
 - 3. model number
 - 4. serial number
 - 5. and principal rating data including the following at the primary design point:
 - a. Capacity in gallons per minute
 - b. rated total dynamic head
 - c. speed in rotations per minute
 - d. efficiency at the primary design point.
- C. Each pump shall also be identified as to name and number by a suitable laminated plastic or stainless steel nameplate mechanically fastened with stainless steel hardware; for example, "Raw Water Pump – 1 (RWP-1)". Coordinate name and number with same on remotely located controls, control panel, and other related equipment.
- D. Nameplates shall not be painted over.

PART 3 – EXECUTION

3.01 SHOP TESTING

- A. The terms Shop Testing and Factory Testing shall be considered to be interchangeable.
- B. Perform Shop Testing in conformance with Section 46 00 00 – Equipment General Provisions.
- C. The CONTRACTOR shall be responsible for the coordination of factory testing of each pump, variable speed drive, and motor. Pump tests shall utilize the actual motors and pump motor bases and couplings to be furnished with the pumping equipment. Where required as indicated by the individual pump specification sections, variable speed pumps shall be tested with the actual variable speed controllers supplied for the project. Use of the pump manufacturers standard test motors and test stand is not acceptable.
- D. Factory testing shall be conducted in accordance with the latest version of Hydraulic Institute Standard 14.6, Hydraulic Performance Acceptance Tests. For submersible pumps, testing shall be conducted in accordance with the latest version of ANSI/HI 11.6.
- E. Hydraulic Performance Acceptance Tests
 - 1. The testing procedure shall be submitted to the Engineer for review and approval before scheduling the testing. The Owner/Engineer shall be given at least 2 weeks advanced notice of the scheduled testing date.
 - 2. Notification and payment of expenses for witness testing shall be as described in Section 46 00 00 – Equipment General Provisions wherever individual pump specifications call for witness testing
 - 3. Pump rating point shall be within the tolerances specified for Acceptance Grade 1U unless otherwise specified in the individual pump specifications.
 - 4. Factory performance test shall include a minimum of seven test points between shutoff and runout.
 - 5. Where required by the individual equipment specification sections, NPSH tests shall be conducted to demonstrate compliance with the specified NSPH requirements. Where full curve NPSH testing is required, a minimum of four points shall be tested.
 - 6. Certified test curves shall be provided for all centrifugal pumps unless otherwise specified in the individual pump specifications.
 - a. Certified tests will not be required for pumps with motors less than 5 hp.

- b. Certified curves shall identify minimum continuous stable flow (minimum flow to avoid suction recirculation) and preferred operating region (POR) and allowable operating region (AOR) per the latest version of ANSI/HI 9.6.3.
- 7. Where required by the individual pump specification sections, factory vibration testing shall be performed to demonstrate compliance with HI 9.6.4.
- 8. For wet pit submersible pumps and vertical turbine pumps, all tests shall be run at minimum pump submergence specified in the individual pump specifications.
- 9. All instruments shall be calibrated as required by ANSI/HI 14.6 or 11.6 as applicable.
- F. Where required in the individual pump specifications, a certified hydrostatic test shall be completed on each pumping unit in accordance with ANSI/HI 14.6 or 11.6 as applicable. Test pressure shall be 1.5 times maximum operating head or 1.25 times shutoff head, whichever is greater.
- G. Where required in the individual pump specifications, each individual casting shall be Brinnell tested in a minimum of two places, in an area of representative casting thickness to ASTM Method E-10. Results shall be certified by a registered professional ENGINEER.
- H. Shop testing of electric motors shall conform to:
 - 1. Section 46 00 00 – Equipment General Provisions
 - 2. Section 26 05 60 – Low-Voltage Electric Motors

3.02 SHIPMENT, DELIVERY, HANDLING AND STORAGE

- A. Shipment, delivery and handling of equipment and materials shall be in accordance with Section 01 65 00 – Product Delivery Requirements.
- B. Storage of equipment shall be in accordance with Section 01 66 00 – Product Storage and Protection Requirements.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- D. Machined surfaces of all exposed pump openings or other exposed unpainted surfaces shall be protected by wooden blanks or Cosmoline, as appropriate, strongly built and securely bolted thereto.
- E. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Manufacturer's field services shall be in accordance with:
 - 1. Section 01 75 00 - Checkout and Startup Procedures
 - 2. Section 46 00 00 - Equipment General Provisions
 - 3. Section 01 79 00 – Instruction of Owner Personnel
- B. Unless otherwise referenced in the individual pump specification section, as a minimum the services of the manufacturer's representative shall be provided for as stated in the following schedule:

Service	Number of Trips	Number of Days/Trip
Installation and Testing	1	1
Startup and Training	1	1
Services after Startup	1	1

- C. Any additional time required to achieve successful installation and operation shall be at the expense of the CONTRACTOR

3.04 INSTALLATION

- A. Pumping equipment shall be installed in accordance with Section 46 00 00 – Equipment General Provisions, the manufacturer's recommendations, accepted procedures submitted with the shop drawings and as indicated on the Drawings, unless otherwise accepted by the ENGINEER.
- B. Level pump and motor and grout feet or baseplate with “Epoxy Base Plate Grout” in accordance with Section 03 30 05 – Concrete and Grout. Ensure minimum grout depth is obtained as recommended by the pump and grout manufacturers.
- C. Drains: All gland seals, air valves, and drains shall be piped to the nearest floor drain or trench drain with stainless steel pipe or copper tube (as appropriate for the environment), properly supported with brackets.
- D. Contractor shall have unit responsibility for the proper coordination, sizing, and installation of the pump foundation/mounting requirements based on the manufacturer's recommendations, subject to Engineer's review and comment.

3.05 ALIGNMENT

- A. Pumping equipment shall be aligned in accordance with Section 46 00 00 – Equipment General Provisions, the manufacturer's recommendations, accepted procedures submitted with the shop drawings and as indicated on the Drawings.
- B. Equipment shall be aligned and free from binding, scraping, excessive vibration, shaft runout, or other defects. Pump drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing.
- C. As a minimum, comply with International Standard, ISO 1940 – Mechanical Vibration – Balance quality requirements for rotors balance quality grade for rotors in a constant rigid state.

3.06 FIELD TESTING

- A. Comply with Section 46 00 00 – Equipment General Provisions for applicable preliminary and final field testing requirements supplementary to those described in this specification.
- B. Comply with Section 01 75 00 – Checkout and Startup Procedures.
- C. All pumping units shall be field tested after installation, in accordance with the Contract Documents, to demonstrate satisfactory operation over the full operating speed range, without excessive noise, vibration, cavitation, and overheating of the bearings. The field testing shall be performed in the presence of an experienced field representative of the manufacturer of each major item of equipment, who shall supervise the following tasks and shall certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation:
 - 1. Pumps shall be tested for vibration over the full specified speed range. Unless otherwise required by individual specification sections, vibration shall be within the limits identified in the latest version of ANSI/HI 9.6.4 (or ANSI/HI 11.6 for submersible pumps), or manufacturer's limits if more stringent. If vibration is greater than the limits identified in ANSI/HI 9.6.4, follow-up vibration testing shall be completed after a 90-day break-in period to ensure that vibration remains within ANSI/HI 9.6.4 allowable limits. If vibration exceeds the allowable limits during the follow up testing, modifications shall be made as a warranty repair.
 - 2. Bearing temperatures shall be determined. A running time of at least 20 minutes shall be maintained for this test, unless liquid volume available is insufficient for a complete test.
 - 3. Where specified in the individual pump specifications, the natural frequencies of each installed pump shall be determined using the “bump test” method. Natural frequency testing shall demonstrate a minimum of 10% separation from the 1x running speed, 2x running speed and vane pass frequencies.

4. Pump performance shall be documented by obtaining concurrent readings, showing motor power, flow, pump suction head, and pump discharge head, for at least five (5) pumping conditions at full speed. One of the points shall be within -5% and 0%, and one being within 0% and +5% of the guarantee point flow rate; the remaining three points shall be spaced over the allowable operating range of the pump performance curve with points taken at or near the maximum allowable (shutoff) head region and at or near the maximum allowable flow (runout). Additional reduced speed testing shall be performed to demonstrate that pumps can achieve performance at turndown conditions where specified in individual pump specification sections. Each power lead to the motor shall be checked for proper current balance. Flow shall be measured to the extent possible by permanently installed instrumentation or drawdown measurement. The rated motor nameplate current shall not be exceeded at any point. Pumps with drive motors rated at less than five horsepower shall only be tested for overcurrent when overheating or other malfunction becomes evident in general testing. Field performance testing shall meet HI 14.6 pump acceptance test grade and tolerance band grade 3B.
- D. The field testing shall be witnessed by the Owner or its representative. The CONTRACTOR shall submit to the ENGINEER a written notification of all pump field tests a minimum of one (1) week prior to testing. In the event of failure of any pump to meet any of the above requirements, the CONTRACTOR shall make all necessary modifications, repairs, or replacements to conform to the requirements of the Contract Documents and the pump shall be re-tested at no additional compensation, until found satisfactory. The CONTRACTOR shall then certify in writing that the equipment has been satisfactorily tested, and that all final adjustments thereto have been made. Certification shall include date of final acceptance test, as well as a listing of all persons present during tests, and resulting test data. The costs of all Work performed in this Paragraph by factory-trained representatives shall be borne by the CONTRACTOR.

3.07 FAILURE OF EQUIPMENT TO PERFORM

- A. Comply with Section 46 00 00 – Equipment General Provisions.

3.08 PAINTING

- A. Comply with Section 46 00 00 – Equipment General Provisions.

END OF SECTION

SECTION 43 21 47
VERTICAL TURBINE PUMPS – MODIFIED RADIAL FLOW

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Provide all labor, materials, equipment, motors, anchorage systems, and incidentals necessary for the installation, testing, and placing into operation open-lineshaft vertical turbine pumps and appurtenances at the locations shown on the Drawings and as specified herein. All pumps specified herein shall be supplied by the same manufacturer.
- B. Equipment shall be provided in accordance with the requirements of Section 43 20 00 – Pumps General.
- C. For the purposes of this Section, “Manufacturer” shall mean the designer, manufacturer, supplier and tester of the pump equipment, including selection and assembly of motor. The Manufacturer shall be responsible for the design, coordination, testing, and satisfactory performance of all the components. Inclusion of a specific manufacturer’s name in the Specifications does not mean that the specific manufacturer’s standard product will be acceptable. Specified manufacturer’s or other manufacturer’s standard product shall be modified as required to meet the Specifications.
- D. The Manufacturer shall have unit responsibility for coordinating the proper pump mounting system with the Contractor to ensure stable pump operation. The Contractor shall install, anchor, test, and align the equipment such that vibration levels are within Manufacturer’s recommended tolerances. The Contractor shall provide all supports, stiffeners, etc., that may be required to provide systems that operate reliably and within vibration limits specified by the Manufacturer.
- E. All equipment shall be suitable for water treatment, continuous operation (24 hours per day, 365 days per year).

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Comply with Section 43 20 00 – Pumps General

1.03 ACTION/INFORMATIONAL SUBMITTALS

- A. Product Data: Comply with Section 01 33 00 – Submittal Procedures.
- B. Provide submittals identified in Section 46 00 00 – Equipment General Provisions in addition to the submittals identified herein and in addition to the submittals identified in the individual pumping specification sections.

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- C. Provide submittals identified in Section 43 20 00 – Pumps General.
- D. Shaft critical speed analysis, bearing spacing calculations, and shaft stretch (impeller end-play) analysis with recommended installation lateral adjustment.

1.04 CLOSEOUT SUBMITTALS

- A. Submit warranty documentation in compliance with:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 61 00 - Product Requirements and Options
- B. Operation and Maintenance (O&M) manuals shall be submitted in accordance with Section 01 33 00 – Submittal Procedures and Section 01 78 23 – Operation and Maintenance Data.
- C. Comply with Section 43 20 00 – Pumps General.

1.05 MAINTENANCE MATERIALS SUBMITTALS

- A. Operation and Maintenance (O&M) manuals shall be submitted in accordance with:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 78 23 Operation and Maintenance Data
- B. Comply with Section 01 79 00 – Instructions to Owner’s Personnel.
- C. Comply with Section 46 00 00 – Equipment General.
- D. Comply with Section 43 20 00 – Pumps General.

1.06 QUALITY ASSURANCE SUBMITTALS

- A. Comply with Section 43 20 00 – Pumps General.
- B. Comply with Section 01 75 00 – Check Out and Start Up Procedures.
- C. Installation list demonstrating years of experience producing substantially similar equipment and demonstrating evidence of the number of installations in satisfactory operation for at least five years in the continental United States. At least three installations in the last five years shall be of similar size or larger than specified application.

1.07 GENERAL INFORMATION AND DESCRIPTION

- A. Comply with Section 46 00 00 – Equipment – General Provisions.

1.08 WARRANTY

- A. Warranty requirements shall be as specified in Section 01 61 00 – Product Requirements and Options. Warranty requirements are supplementary to the individual equipment specifications.
- B. Comply with the Equipment Warranties requirements specified in Section 46 00 00 – Equipment General Provisions.

1.09 OPERATING CONDITIONS AND PERFORMANCE REQUIREMENTS

**Vertical Turbine Pump Performance Criteria
Schedule 43 21 47 - 02**

Parameter	Effluent Pump No. 3
Pump Identification Numbers	No. 3
Number of Units	1
Maximum Pump Operating Speed (rpm)	1,775
Minimum Pump Operating Speed (rpm)	500
Number of Stages	2
Primary Operating Point (at maximum pump speed)	
Flow (gpm)	4,000
Total Head (ft)	180
Minimum Pump Efficiency (%)	81
Rating Point shall be within the following range as % of BEP Flow	95% to 100%
Runout Point (at maximum pump speed)	
Flow (gpm)	5,350
Total Head (ft)	106
Minimum Pump Efficiency (%)	67
Maximum NPSH Required (NPSHR) at Primary Operating Point at centerline of impeller of first stage (feet)	28.1
Minimum NSPH Available (NPSHA) at Primary Operating Point at centerline of impeller of first stage (feet)	34
Shut Off Head (feet)	300
Fluid Pumped	Treated Wastewater Effluent
Fluid Temperature (degrees F)	Ambient
Fluid Specific Gravity	1.0
Pump Can Diameter (inches)	30 (Contractor to field verify)
Pump Can Suction Pipe diameter (inches)	16
Nominal Pump Column Diameter (inches)	12

**Vertical Turbine Pump Performance Criteria
Schedule 43 21 47 - 02**

Parameter	Effluent Pump No. 3
Discharge Diameter (inches)	12
Sole-Plate to Suction Bell Length (inches)	See Drawings
Factory test acceptance grade	1U

- A. When operating at the maximum output speed each pump shall have a characteristic performance curve which meets all the minimum conditions listed in the pump schedule. The pumps and drive motors shall be capable of operating satisfactorily under the full-range of speed, flow and pressure conditions as defined by the pump schedule. Pump efficiency as defined herein shall include all losses from the pump intake suction bell to the pump discharge flange. Losses through blank bowls (if any) for initial conditions shall also be considered.

1.10 DEFINITIONS

- A. Terms shall be as defined in ANSI / AWWA E103 Standard for Horizontal and Vertical Line-Shaft Pumps.
- B. Additional terms are defined below:
1. Submergence: Vertical distance in feet between the pumping water level and the bottom of the first stage impeller.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Comply with Section 43 20 00 – Pumps General, except where superseded in this specification section.
- B. Pump Type: Vertical turbine modified radial flow pump.
- C. Anchor bolts and baseplates shall be provided and set per the requirements of the Manufacturer. The Manufacturer shall supply templates for setting the anchor bolt layout.

2.02 ACCEPTABLE MANUFACTURERS

- A. Manufacturer shall have a minimum of 10 years of experience of producing substantially similar equipment and shall be able to show evidence of at least 5 installations in satisfactory operation for at least 5 years in the continental United States.
- B. Pump Manufacturer:

1. Flowserve model 16ENH two stage
 2. Engineer Pre-Approved Equal
- C. The electric motor shall be provided by the pump manufacturer and shall be one of the named manufacturers specified in Section 26 05 60 – Low-Voltage Electric Motors.
- D. All equipment for the pumps, including motors and bases, shall be provided as a complete unit by the pump manufacturer.

2.03 ANCHORS AND SUPPORTS

- A. Comply with the following Specification Sections:
1. Section 05 05 23 – Metal Fastening
 2. Section 46 00 00 – Equipment General Provisions
 3. Comply with individual pump specifications.
- B. Comply with Section 43 20 00 – Pumps General

2.04 MATERIALS OF CONSTRUCTION

- A. Materials of construction shall conform to the requirements listed below.

Schedule 43 21 47 - 03

Component	Effluent Pump No. 3
Pump shafts and line shafts	Stainless steel, Type 17-4PH
Bowl wear rings	Bronze
Bowl impellers	Bronze
Pump bowls, discharge case, and suction bell	Cast Iron
Impeller keys and thrust rings	Stainless steel, Type 416
Pump columns	Carbon Steel Pipe, ASTM A53, Sch 30*
Pump can	Existing (see drawings)
Discharge heads	Carbon Steel, ASTM A53 or A36
Sole plate	Carbon Steel, ASTM A36

Schedule 43 21 47 - 03

Component	Effluent Pump No. 3
Sleeve bearings	Bronze
Lineshaft bearings	Rubber
Bearing Retainers	Bronze or Cast Iron
Basket type suction strainer	Stainless Steel, Type 316L
Cone type suction strainer	Not Applicable
Bolts and nuts	316 Stainless Steel

* Or higher schedule if required to meet vibration criteria.

- B. The impeller and bowl wearing rings shall not be constructed of the same material. Impeller and bowl wearing rings materials shall have a minimum Brinell hardness difference of 50.

2.05 DISCHARGE HEAD

- A. The discharge head shall have bolted register or rabbet-fit connections for the motor. Discharge head shall have connections for the pump column and shall support the loadings that it imposes as well as hydrostatic and hydrodynamic heads.
- B. Design columns and discharge heads for 100% of the pump discharge pressure (suction pressure plus pump differential pressure) at shutoff. Hydrostatically test columns and discharge heads at 130% of design pressure.
- C. Access to the stuffing box shall be through windows placed 90 degrees from the discharge. Fit handholes or windows with stainless steel, expanded or perforated metal guards in stainless steel frames to protect the exposed shaft and coupling.
- D. The discharge head outlet pipe shall be Class 150 flanges, complying with ANSI B16.5. If cast iron discharge heads are specified, flange shall be Class 125.
- E. Provide the following connections on the discharge head:

Schedule 43 21 47 - 04

	Effluent Pump No. 3
Seal Drain	Size as recommended by manufacturer

2.06 SHAFTS

- A. Support the shafting by bearings at intervals so that the first natural frequency complies with Section 43 20 00 – Pumps – General. Calculate the shaft diameter using the formulas given in AWWA E103 for the pump shutoff head.
- B. Shafts shall be supported by no fewer than three bearings (not including stuffing box bushing). Lineshaft bearings shall be supported by bearing retainers of the material listed in this Specification Section's Paragraph "Materials of Construction" and clamped between column pipe flanges for open lineshaft pumps.
- C. Shaft couplings for shaft diameters 2 inches or larger shall be of the key and thrust-ring types or other nonthreaded design.
- D. Shaft diameter and bearing spacing shall be designed to ensure that the entire pump operating speed range is at least 25% away from the shaft critical speeds.
- E. Shaft elongation shall not cause the impeller to contact the bowl at any point along the supplied pump curve.
- F. Solid Shaft Motors: The pump shaft shall be coupled to the motor shaft by a four piece adjustable spacer coupling that allows axial adjustment and removal of the complete seal assembly without disturbing the driver. An adjusting plate shall be part of the coupling.
- G. Total eccentricity between pump shaft and motor shaft for pumps with solid shaft motors shall not exceed 0.002-inch total indicator reading. Angular misalignment shall not exceed 0.001 inch/inch.

2.07 BOWL ASSEMBLY

- A. Each bowl assembly shall consist of the discharge bowl, impeller, impeller shafting, and a bearing above the impeller. A bearing below the first stage impeller shall be located in the suction case or bell.
- B. Pump bowls shall be of the material listed under this Section's Paragraph "Materials of Construction". Bowls shall be sufficiently rigid to prevent adverse changes in bearing alignment and to maintain the running clearances of seal rings. Bowls shall be flanged with male and female rabbets for joining to the suction bell and the discharge column. Waterways and the diffusion vanes shall be smooth and free from nodules, bumps, and dips. Provide the bowls with a renewable wear ring adjacent to the impeller, made of materials as indicated under this Section's Paragraph "Materials of Construction". Cast iron bowls shall be internally lined with vitreous enamel or coated with 12 mils of fusion bonded epoxy. All fusion bonded epoxy shall be heat-cured.

2.08 SUCTION BELL

- A. The suction bell shall have, as an integral part, vanes supporting a central hub in which the bottom bearing is carried below the impeller. The outer suction bell entrance shall be at least the size of the maximum pump bowl dimension and as much larger as is practical. Maximum entrance velocity shall not exceed 5 fps based on the outside diameter of the suction bell. The contour between the outer edge and the impeller suction eye shall be smooth, continuous, and bell shaped.

2.09 IMPELLERS

- A. Pump impellers shall be of the enclosed type, cast in one piece of the material listed in this Section's Paragraph "Materials of Construction". Impellers shall incorporate a close-fitting annular clearance with the case at the suction eye and be equipped with replaceable wearing rings. Impellers shall be positively secured to the shaft in such a manner that they cannot become loose under any operating condition or under reverse rotation or torque. For pumps having bowl diameters greater than 15 inches and all pumps with stainless steel impellers and shafts, impellers shall be keyed to the shaft and positively secured against axial movement. Dynamically balance impellers to the tolerances specified by ISO 1940-1, grade G-6.3. Provide for adjustment of the axial position of the impellers at the pump shaft connection to the motor shaft to obtain proper clearance between bowls and impellers.

2.10 VIBRATION

- A. The maximum vibration level measured on the top of the discharge head for any speed and operating point within the Preferred Operating Region shall not exceed that shown in Figure 9.6.4.2.5.16 of the Hydraulic Institute Standards as measured on the installed pump during field testing.
- B. The CONTRACTOR shall coordinate pump installation requirements with the pump supplier to ensure a stable installation free of abnormal vibration.
- C. The pump supplier shall have unit responsibility for coordinating and fabricating the proper pump mounting design for the layout shown on the drawings. If, in the opinion of the pump supplier, the openings or other aspects of the pump mounting design must be revised to allow for acceptable vibration and stable pump operation, the Contractor shall submit said revisions to the Engineer for review, comment and acceptance. The Contractor shall then be responsible for implementing such revisions at no additional cost.

2.11 SOLE PLATES

- A. The pump manufacturer shall design and fabricate a sole-plate. The pump discharge head shall be mounted to the sole plate.
- B. Sole plates shall be machined for smooth mounting of the discharge head.

- C. See structural Drawings for additional sole plate design requirements.
- D. The sole plate minimum thickness shall be as indicated on the Drawings.
- E. Field verify all dimensions and design sole plate to ensure no conflict with the existing structure.
- F. The pump manufacturer is responsible for the design of the anchor bolts. The diameter and embedment of the anchor bolts shown on the Drawings is for conceptual purposes only.

2.12 DISCHARGE HEAD AND COLUMN FABRICATION

- A. Welding shall conform to the following:
 - 1. Welding procedures and performance qualifications shall be in accordance with AWWA Standards with written certification from the manufacturer.
 - 2. The minimum number of passes for welded joints shall be as follows:

Schedule 43 21 47 - 05	
Steel Cylinder Thickness (inch)	Minimum Number of Passes for Welds
Less than 0.1875	1
0.1875 through 0.25	2
Greater than 0.25	3

- 3. Welds shall be full circumferential.
- B. Beveled ends for butt welding shall conform to ANSI B16.25. Remove slag by chipping or grinding. Surfaces shall be clean of paint, oil, rust, scale, slag, and other material detrimental to welding.
- C. Test the seams by the dye-penetrant method per ASTM E 165, Method B.
- D. Welded stainless steel components shall be pickled and passivated following fabrication. All surfaces shall be free of heat tint, scale and slag. Manufacturer shall provide written certification that passivation has been completed prior to shipment of equipment.

2.13 STRUCTURAL STEEL

- A. Comply with Section 43 20 00 – Pumps General.

2.14 DISSIMILAR METALS

- A. Comply with Section 43 20 00 – Pumps General.

2.15 STANDARDIZATION OF GREASE FITTINGS

- A. Grease Fittings: Comply with Section 46 00 00 – Equipment General Provisions.

2.16 APPURTENANCES

- A. Mechanical Seals:
 - 1. Manufacturers: Chesterton, Flowserve, John Crane, or equal
 - 2. Shaft Seal Schedule 43 21 47 – 06:

Shaft Seal Schedule 43 21 47 - 06

Parameter	Treated Wastewater Effluent
Shaft Sealing Arrangement	Elastomeric Bellows Type Mechanical Seal
Seal Flush Source / API Flush Plan	Product / Plan 13
Seal Face Material	Carbon vs. Silicon Carbide
Metallic Components	316 SST
Flexible Components	EPDM

- B. Pressure Gages: Provide pressure gages as indicated on the drawings and as specified under Section 43 20 00 – Pumps General and Section 40 73 13 – Pressure and Differential Pressure Gauges.
- C. The motor for the pump shall be of the vertical solid shaft fan cooled squirrel cage induction type in accordance with Section 26 05 60 – Low Voltage Electric Motors. The motor shall be designed to accept all downthrust and upthrust loads imposed by the pump during starting and running. The maximum speed and horsepower of each motor shall be as specified. The rated horsepower shall be such that the motors will not be overloaded nor the motor nameplate horsepower exceeded when the pumps are operated at any point on the pump performance curve.
- D. Motors shall be specifically designed for operation with variable frequency drive speed controls as specified in Section 26 05 60 – Low Voltage Electric Motors and Section 26 29 23 – Low Voltage Variable Frequency Motor Controllers.
- E. Motor Data

**Electrical and Instrumentation Requirements
Schedule 43 21 47 - 07**

Motor Data	Effluent Pump No. 3
Type	Direct Coupled – Vertical
Voltage	460v

**Electrical and Instrumentation Requirements
Schedule 43 21 47 - 07**

Motor Data	Effluent Pump No. 3
Phase	3
Frequency	60 Hz
Horsepower	250
Maximum Speed, rpm	1,775
Minimum Reduced Speed, rpm	500
Enclosure Type	TEFC
Insulation	Class H
Inverter Duty*	Yes
Service Factor	1.0
Thermal Protection	Thermostats
Motor Speed Control	Variable Frequency Drive
Maximum Sound at 3 feet	Not Used
Space Heater	Yes, 120 V, single phase
Motor auxiliary fan	Yes
Motor Winding Temperature Protection	Temperature Switches
Non-reverse ratchet	Yes
Shaft Grounding Rings	Yes
Insulated Bearings	Yes
Miscellaneous	See Note

NOTE: Provide oversized Terminal Box. Provide breathers and drains for TEFC enclosures.

* Manufacturer shall coordinate the settings of the variable frequency drive with the pump and motor to ensure proper operation. A written transmittal of the drive settings shall be sent to the Contractor prior to start-up of the equipment.

- F. TEFC motors controlled by a variable frequency drive shall be provided with a separately powered cooling fan motor that runs at 60HZ to ensure proper cooling of the motor at low speeds in accordance with Section 26 05 60 - Low-Voltage Electric Motors. Cooling fan motor shall be integrally powered from the pump motor.
- G. Thrust bearings and guide bearings shall be anti-friction type and grease or oil lubricated. Thrust bearings for motors of 125 hp and larger and guide bearings for motors of 250 hp and larger shall be oil lubricated. Bearings shall have a minimum ABMA L10 life of 100,000 hours. Water cooling of thrust bearings shall not be used.
- H. Non-reverse ratchet shall not engage above the minimum motor speed in Motor Data Table. The manufacturer shall certify that the proposed non-reverse ratchets are able to

withstand reverse torques in excess of the maximum possible reverse torque in the application in order to ensure that the proposed non-reverse ratchets is/are able to withstand the worst case torques that have the potential to result.

- I. Non-reversing ratchet type: Ball type

2.17 EQUIPMENT IDENTIFICATION

- A. Comply with Section 43 20 00 – Pumps General.

PART 3 – EXECUTION

3.01 SHOP TESTING

- A. Factory testing shall be in accordance with Section 43 20 00 – Pumps General, and shall include:

Shop Testing Schedule 43 21 47 - 09	
	Effluent Pump No. 3
Certified Performance Curves	Yes

- B. Pump performance test acceptance grade shall be as scheduled in Part 1 of this specification as defined by HI Standards; however, required power shall not exceed motor horsepower rating at any point on the rated pump curve.

3.02 SHIPMENT, DELIVERY, HANDLING AND STORAGE

- A. Shipment, delivery and handling of equipment and materials shall be in accordance with Section 01 65 00 – Product Delivery Requirements.
- B. Store equipment as required by the manufacturer.

3.03 MANUFACTURER’S FIELD SERVICES

- A. The services of a qualified manufacturer's technical representative shall be provided in accordance with Section 43 20 00 – Pumps General. For this contract, field services shall include the following Site Visits Schedule 43 23 18 - 07:

Site Visits Schedule 43 21 47 - 10		
Service	Number of Trips	Number of Days/Trip
Installation and Testing	1	1
Startup and Training	1	1
Services after Startup	1	1

3.04 INSTALLATION

- A. Install pump in strict accordance with manufacturer’s recommendations and Section 43 20 00 – Pumps General.
- B. Manufacturer’s technical representative shall perform or supervise the following activities prior to starting each pump:
 - 1. Installation of mechanical seals
 - 2. Alignment of pump and motor shafts
 - 3. Impeller end clearance adjustment
- C. After installation and until substantial completion, all pump shafts shall be rotated weekly in the presence of the City.

3.05 ALIGNMENT

- A. Comply with Section 43 20 00 – Pumps General.

3.06 FIELD TESTING

- A. Field testing shall be in accordance with Section 43 20 00 – Pumps General, and shall include the following Field Testing Schedule:

Field Testing Schedule 43 21 47 - 11

	Effluent Pump No. 3
Field Performance Testing	Yes
Vibration Testing	Yes
Natural Frequency “Bump” Test	No

- B. Field vibration and alignment tests shall be performed on all pumps. The Contractor shall procure the services of an independent predictive/preventive maintenance laboratory service to perform baseline vibration tests on the subject equipment. The testing laboratory shall be independent from the Contractor and Supplier. Testing shall be conducted at maximum, intermediate and minimum pump operating speeds for the assembled pumping units in place after installation. Vibration tests will be conducted in the presence of the Owner in accordance with the procedures outlined in the applicable standards of the Hydraulic Institute and maximum vibration shall be within the limits set forth therein. In the event vibration exceeds the specified limits, the pump manufacturer shall make all required balancing and frame adjustments to bring the equipment within the Hydraulic Institute limits and re-perform the baseline vibration testing until the system complies prior to acceptance of any pumping equipment. The results of the final baseline analysis will be delivered to the OWNER.

- C. Noise measurements shall be taken in the field and shall comply with Hydraulic Institute Standards and as specified herein.
- D. After the pump manufacturer's representative has determined the pump installation is correct and the pumps are ready for continuous use, City shall test operate the pumps under actual operating conditions for the next seven days.

3.07 FAILURE OF EQUIPMENT TO PERFORM

- A. Comply with Section 46 00 00 – Equipment General Provisions.

3.08 PAINTING

- A. Comply with Section 46 00 00 – Equipment General Provisions.
- B. Mating surfaces of mounting flanges and sole plates shall not be coated.
- C. The interior and exterior of carbon steel pump columns shall be coated in accordance with the specification section titled "Painting".
- D. Cast iron pump bowls, discharge case, and suction bell shall be internally lined with vitreous enamel or coated with 12 mils of fusion bonded epoxy as indicated in Article 2.07.
- E. Cast iron pump bowls, discharge case, and suction bell shall be externally coated as indicated in the Section 09 90 00 – Painting.
- F. Manufacturer's standard coating system will be accepted if it provides a similar level of service as that specified.

END OF SECTION

SECTION 46 00 00
EQUIPMENT GENERAL PROVISIONS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, test, and place in acceptable operation all mechanical equipment and all accessories as specified herein, as shown on the Drawings, and as required for a complete and operable system.
- B. The mechanical equipment shall be provided complete with all accessories, special tools, spare parts, mountings, shims, sheaves, couplings, and other appurtenances as specified, and as may be required for a complete and operating installation.
- C. The Contractor shall provide the Owner complete and operational equipment/systems. To this end, it is the responsibility of the Contractor to coordinate all interfaces with related mechanical, structural, electrical, instrumentation, and control work and to provide necessary ancillary items such as controls, wiring, etc., to make each piece of equipment operational as shown and specified.
- D. The complete installation shall be free from excessive vibration, cavitation, noise, and oil or water leaks.
- E. The requirements of this section shall apply to equipment furnished under Divisions 40, 41, 43, and 46.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. All equipment, materials, and installations shall conform to the requirements of the most recent editions with latest revisions, supplements, and amendments of the specifications, codes, and standards listed in Section 01 42 00 – References.

1.03 ACTION/INFORMATIONAL SUBMITTALS

- A. Product Data: Comply with Section 01 33 00 – Submittals Procedures
- B. Shop Drawings shall be submitted to the Engineer for all equipment in accordance with Section 01 33 00 – Submittal Procedures and shall include the following additional information:
 - 1. Equipment name, identification number and specification number.
 - 2. Performance characteristics and descriptive data.
 - 3. Detailed equipment dimensional drawings and setting plans.

4. Drive and motor data as required by Division 26 – Electrical. Where pump and motor speeds are to be regulated by variable speed drives, the CONTRACTOR shall coordinate, furnish and exchange all necessary requirements with the respective equipment manufacturers to ensure compatibility and shall submit pump, motor and variable speed drive shop drawings together as a complete system.
5. Information on bearing types and bearing life.
6. Gear box design and performance criteria and AGMA service factor.
7. Piping schematics.
8. Equipment protective device details and connection diagrams.
9. Panel layout drawings, schematic wiring diagrams, and component product data sheets for control panels.
10. A list of spare parts and special tools to be provided.
11. Any additional information required to demonstrate conformance with the equipment specifications.
12. Warranty documentation including statement of duration of warranty period and contact phone numbers and addresses for warranty issues.
13. Shipment, delivery, handling, and storage instructions.

1.04 CLOSEOUT SUBMITTALS

- A. Submit warranty documentation in compliance with:
 1. Section 01 33 00 – Submittal Procedures
 2. Section 01 61 00 – Product Requirements and Options
- B. Operation and Maintenance (O&M) manuals shall be submitted in accordance with Section 01 33 00 – Submittal Procedures and Section 01 78 23 Operation and Maintenance Data.

1.05 MAINTENANCE MATERIALS SUBMITTALS

- A. Operation and Maintenance (O&M) manuals shall be submitted in accordance with:
 1. Section 01 33 00 – Submittal Procedures
 2. Section 01 78 23 – Operation and Maintenance Data

- B. Comply with Section 01 79 00 – Instructions to Owner’s Personnel.

1.06 QUALITY ASSURANCE SUBMITTALS

- A. Factory testing plan.
- B. Factory Test Results shall be submitted and approved prior to shipment of equipment.
- C. Field testing plan.
- D. Comply with Section 01 75 00 – Check Out and Start Up Procedures.
- E. Preliminary field test data
- F. Final field test data

1.07 GENERAL INFORMATION AND DESCRIPTION

- A. All parts of the equipment furnished shall, be designed and constructed for the maximum stresses occurring during fabrication, transportation, installation, testing, and all conditions of operation. All materials shall be new and shall conform to all applicable Sections of these Specifications.
- B. All parts of duplicate equipment shall be interchangeable without modification. Manufacturer's design shall accommodate all the requirements of these Specifications.
- C. Equipment and appurtenances shall be designed in conformity with specifications, codes and reference standards.
- D. All bearings and moving parts shall be protected by bushings or other Engineer approved means against wear, and provision shall be made for accessible lubrication by extending lubrication lines and fittings to approximately 30 inches above finished floor elevation.
- E. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, etc., shall be finished in appearance. All exposed welds on machinery shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.
- F. Machinery parts shall conform within allowable tolerances to the dimensions shown on the working drawings.
- G. All machinery and equipment shall be safeguarded in accordance with the specifications, codes, and reference standards.

- H. All rotating shafts, couplings, or other moving pieces of equipment shall be provided with protective guards of sheet metal or wire mesh, neatly and rigidly supported. Guards shall be removable as required to provide access for repairs.
- I. All equipment greater than 100 pounds shall have lifting lugs, eyebolts, etc., for ease of lifting, without damage or undue stress exerted on its components.
- J. All manufactured items provided under this Section shall be of current manufacture and shall be the products of manufacturers specializing in the manufacture of such products.

1.08 EQUIPMENT WARRANTIES

- A. Warranty requirements shall be as specified in Section 01 75 00 – Checkout and Startup Procedures. Warranty requirements are supplementary to the individual equipment specifications.

PART 2 – PRODUCTS

2.01 ANCHORS AND SUPPORTS

- A. The Contractor shall furnish, install, and protect all necessary guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of the devices included in the equipment specified. Working Drawings for installation shall be furnished by the equipment manufacturer, and suitable templates shall be used by the Contractor when required in the detailed equipment Specifications.
- B. Anchor bolts and fasteners shall be furnished in accordance with Section 05 05 23 – Metal Fastening, and with the individual equipment Specifications. All anchor bolts shall be a minimum of 1/2-inch diameter. All anchor bolts, guard bolts, washers, clips, clamps, and fasteners of any type shall be constructed of 316 stainless steel, unless otherwise specified in the individual equipment Specifications.
- C. The Contractor shall provide all concrete pads or pedestals required for equipment furnished. All concrete equipment pads shall be a minimum of 6” high, unless otherwise shown on the Drawings and shall be doweled.
- D. Pipe sleeves or other means of adjusting anchor bolts shall be provided where indicated or required. Equipment shall be leveled by first using sitting nuts on the anchor bolts, and then filling the space between the equipment base and concrete pedestal with non-shrink grout, unless alternate methods are recommended by the manufacturer and are acceptable to the Engineer (such as shim leveling pumps, or chemical grout).

2.02 DISSIMILAR METALS

- A. All dissimilar metals shall be isolated.

2.03 STANDARDIZATION OF GREASE FITTINGS

- A. The grease fittings on all mechanical equipment shall be such that they can be serviced with a single type of grease gun. Fittings shall be "Zerk" type.

2.04 ELECTRICAL REQUIREMENTS

- A. All electrical equipment and appurtenances, including but not limited to motors, panels, conduit, and wiring, etc., specified in the equipment specifications shall comply with the applicable requirements of the Division 26 specifications and the latest National Electric Code. Motor starters and controls shall be furnished and installed under Division 26 and Division 40 unless otherwise specified in the individual pump specifications.
- B. In the individual equipment specifications, specified motor horsepower is intended to be the minimum size motor to be provided. If a larger motor is required to meet the specified operating conditions and performance requirements, the Contractor shall furnish the larger sized motor and shall upgrade the electrical service (conduit, wires, starters, etc.) at no additional cost to the Owner.
- C. Where variable frequency drives (VFDs) are specified, the Contractor shall be responsible for coordinating between equipment supplier and VFD supplier to ensure a complete and operational system. VFDs shall be furnished under Division 26 unless otherwise specified in the equipment specification.
- D. Motor starters and controls shall be furnished and installed under Division 26 and Division 40 unless otherwise specified in the individual equipment specifications.

2.05 EQUIPMENT IDENTIFICATION

- A. All mechanical equipment shall be provided with a substantial stainless-steel nameplate, mechanically fastened with stainless steel hardware in a conspicuous place, and clearly inscribed with the manufacturer's name, year of manufacture, serial number, and principal rating data.
- B. Each pump and other piece of mechanical equipment shall also be identified as to name and number by a suitable laminated plastic or stainless-steel nameplate mechanically fastened with stainless steel hardware; for example, "Raw Water Pump #1". Coordinate name and number with same on remotely located controls, control panel, and other related equipment.
- C. Nameplates shall not be painted over.

PART 3 – EXECUTION

3.01 SHOP TESTING

- A. All equipment shall be tested in the shop of the manufacturer in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents and that it will operate in the manner specified or implied.
- B. No equipment shall be shipped to the project until the Engineer has been furnished a certified copy of test results and has notified the Contractor, in writing, that the results of such tests are acceptable.
- C. A certified copy of the manufacturer's actual test data and interpreted results thereof shall be forwarded to the Engineer for review.
- D. Shop testing of electric motors shall conform to:
 - 1. Section 26 05 60 – Low-Voltage Electric Motors
 - 2. Section 26 05 00 – Basic Electrical Requirements.

3.02 SHIPMENT, DELIVERY, HANDLING AND STORAGE

- A. Shipment, delivery, and handling of equipment and materials shall be in accordance with Section 01 65 00 – Product Delivery Requirements.
- B. Storage of equipment and materials shall be in accordance with Section 01 66 00 – Product Storage and Protection Requirements.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Manufacturer's field services shall be in accordance with Section 01 75 00 – Checkout and Startup Procedures.
- B. The Contractor shall arrange for a qualified factory trained Technical Representative from each manufacturer or supplier of equipment who is regularly involved in the inspection, installation, start-up, troubleshooting, testing, maintenance, and operation of the specified equipment. Qualification of the Technical Representative shall be appropriate to the type of equipment furnished and subject to the approval of the Engineer and the Owner. Where equipment furnished has significant process complexity, furnish the services of engineering personnel knowledgeable in the process involved and the function of the equipment. When necessary, the Contractor shall schedule multiple Technical Representatives to be present at the same time for the purpose of coordinating the operation of multiple pieces of related equipment.
- C. Services of the Technical Representative will require a minimum of two (2) site visits, one for installation and testing and one for startup and training, and will be for the

minimum number of days recommended by the manufacturer and approved by the Engineer but will not be less than the number of days specified in individual equipment sections. Additional site visits may be required as described below and in the equipment specifications.

- D. For each site visit, the Technical Representative shall submit jointly to the Owner, the Engineer, and the Contractor a complete signed report of the results of his inspection, operation, adjustments, and testing. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified.
- E. The manufacturer's Technical Representative shall provide the following services.
 - 1. Installation: The Technical Representative shall inspect the installed equipment to verify that installation is in accordance with the manufacturer's requirements. Where required by individual equipment specifications, the Technical Representative shall also supervise the installation of the equipment.
 - 2. Testing: After installation of the equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the Technical Representative shall inspect, operate, test, and adjust the equipment as required to prove that the equipment is in proper condition for satisfactory operation under the conditions specified. Unless otherwise noted in the signed site visit report, the report shall constitute a certification that the equipment conforms to the requirements of the Contract and is ready for startup and that nothing in the installation will render the manufacturer's warranty null and void. The report shall include date of final acceptance field test, as well as a listing of all persons present during tests.
 - 3. Startup: The Technical Representative shall start up the equipment for actual service with the help of the Contractor. If equipment or installation problems are experienced, the Contractor and the representative shall provide the necessary services until the equipment is operating satisfactorily and performing according to the specifications at no additional cost to the Owner. Unless otherwise noted in the signed site visit report, the report shall constitute a certification that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
 - 4. Training: Training shall be provided in accordance with Section 01 79 00 –Instruction of Owner Personnel.
 - 5. Services after Startup: Where required by the individual equipment specifications, the Technical Representative shall return to the project site thirty (30) days after the startup date to review the equipment performance, correct any equipment problems, and conduct operation and maintenance classes as required by the

Owner. This follow-up trip is required in addition to the specified services of Technical Representative prior to and during equipment startup. At this time, if there are no equipment problems, each manufacturer shall certify to the Owner in writing that his equipment is fully operational and capable of meeting operating requirements. If the equipment is operating incorrectly, the Technical Representative will make no certification to the Owner until the problems are corrected and the equipment demonstrates a successful thirty (30) days operating period.

- F. The Contract amount shall include the cost of furnishing the Technical Representative for the minimum number of days specified, and any additional time required to achieve successful installation and operation. The times specified for services by the Technical Representative in the equipment Specifications are exclusive of travel time to and from the facility and shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to place the equipment in satisfactory operation.
- G. The Contractor shall notify the Engineer at least 14 days in advance of each equipment test or Owner training session.
- H. The Technical Representative shall sign in and out at the office of the Engineer's Resident Project Representative on each day the Technical Representative is at the project.

3.04 INSTALLATION

- A. The Contractor shall obtain written installation manuals from the equipment manufacturer prior to installation. Equipment shall be installed strictly in accordance with recommendations of the manufacturer. A copy of all installation instructions shall be furnished the Engineer's field representative one week prior to installation.
- B. The Contractor shall have on hand sufficient personnel, proper construction equipment, and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory-assembled insofar as practical.
- C. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Drawings.
- D. All equipment sections and loose items shall be match-marked prior to shipping.
- E. For equipment that requires field alignment and connections, the Contractor shall provide the services of the manufacturer's qualified mechanic, millwright, or machinist, to align the equipment and motor prior to making piping connections or anchoring the equipment base. Alignment shall be as specified herein.

- F. The Contractor shall furnish oil and grease for initial operation and testing. The manufacturer and grades of oil and grease shall be in accordance with the recommendations of the equipment manufacturer.

3.05 ALIGNMENT

- A. Set equipment to dimensions shown on drawings. Dimensions shall be accurate to +/- 1/16 inch unless otherwise noted on the drawings. Wedges shall not be used for leveling, aligning, or supporting equipment.
- B. General Equipment Leveling: Non-rotating equipment shall be set level to +/- 1/16 inch per 10-foot length (.005 inch per foot) unless otherwise noted on the drawings. Shims shall be used unless equipment is furnished with leveling feet. Set shims flush with equipment baseplate edges. When grouting is required, equipment shall be shimmed to allow a minimum of one-inch grout thickness. Grout shall cover shims at least 3 inches. Final level check shall be held for inspection and approval by Engineer before proceeding.
- C. Grouting
 1. Fill anchor bolt holes or sleeves with grout, after bolt alignment is proven, and prior to placing grout under equipment bases.
 2. Surface Preparation. Roughen surface by chipping, removing laitance, and unsound concrete. Clean area of all foreign material such as oil, grease, and scale. Saturate area with water at least 4 hours prior to grouting, removing excess water ponds.
 3. Application. Place grout after the equipment base has been set and its alignment and level have been approved. Form around the base, mix grout, and place in accordance with the grout manufacturers published instructions. Eliminate all air or water pockets beneath the base using a drag chain or rope.
 4. Finishing. Point the edges of the grout to form a smooth 45-degree slope.
 5. After grout has cured (not before 3 days after placement) paint exposed surfaces of grout with shellac.
 6. Level Verification. After grout has cured, and immediately prior to drive alignment, recheck equipment for level and plumb. Re-level and square as necessary. Hold final checks for inspection and approval by Engineer.
- D. Inspect for and remove all machining burrs or thread pulls in female holes on mating surfaces of mounting frame and machine feet.
- E. Inspect and clean equipment mounting base pads, feet, and frames to remove all grease, rust, paint, and dirt.

- F. Assembled equipment shafts shall be set level to .0015 inches per foot of shaft length (+/- .0005 inches) up to a maximum of 0.015 inches for any length shaft unless the manufacturers requirements are more stringent or unless otherwise noted in the equipment specifications. Use the machined surfaces on which the equipment sets for the base/mounting frame leveling plane. Use the machined shaft surface for equipment leveling plane.
- G. Sprocket and Sheave Alignment. Check shaft mounted components for face runout and eccentricity (outside diameter) runout by magnetically mounting a dial indicator on a stationary base and indicating over 360 degrees on a continuous machined surface at the outside diameter of the component. Maximum allowable total indicated face runout and eccentricity for sprockets and sheaves will be per ANSI Standard B29.1-1975.
- H. Belt tensioning. Set drive belt tension to manufacturer's specification for the belt type. Recheck alignment after drive tensioning.
- I. Thermal/Mechanical Growth. Thermal/mechanical growth corrections for driver and driven machines will be used in vertical and horizontal alignment where applicable. The equipment manufacturer will determine thermal/mechanical growth applicability for any machine and provide the correction offsets to be used.
- J. Rotating Shaft Alignment
 - 1. Fixtures will be set up on the driver and driven machine, machines shaft surfaces. Machined coupling hubs may be used only if there is no clearance to mount fixtures directly on the shafts.
 - 2. Primary alignment method for direct drive machines is when coupled. Uncoupled alignment will be used only when approved by the Engineer.
 - 3. Account for possible coupling flex by always rotating coupled machines in the same direction during alignment.
 - 4. Uncoupled machines must be connected so that both shafts turn together without relative motion during alignment.
 - 5. Indicator bar sag will be measured and included for each reverse indicator alignment setup.
 - 6. Reverse Dial Indicator. The final maximum allowable misalignment: vertical and horizontal from the desired targets of .000 inches (for a non-thermal growth machine) or from the given target readings (for a thermal growth machine) must meet BOTH of the following conditions simultaneously: 1/2 the final total indicator reading at each indicator will be no more than shown in the table below AND the final remaining correction at each machine foot be no more than .001 inches of required movement.

Machine Speed (RPM)	Total Misalignment* (inches)
Up to 1800	.002
1800 and greater	.001

* 1/2 indicator reading

3.06 FIELD TESTING

- A. Field testing shall be in accordance with Section 01 75 00 – Checkout and Startup Procedures.
- B. All equipment shall be set, aligned, and assembled in conformance with the manufacturer's drawings and instructions. Provide all necessary calibrated instruments to execute performance tests. Submit report certified by the pump manufacturer's representative.
- C. Preliminary Field Tests, Yellow Tag
 - 1. As soon as conditions permit, after the equipment has been secured in its permanent position, the Contractor shall:
 - a. Verify that the equipment is free from defects.
 - b. Check for alignment as specified herein.
 - c. Check for direction of rotation.
 - d. Check motor for no load current draw.
 - 2. Contractor shall flush all bearings, gear housings, etc., in accordance with the manufacturer's recommendations, to remove any foreign matter accumulated during shipment, storage or erection. Lubricants shall be added as required by the manufacturer's instructions.
 - 3. When the Contractor has demonstrated to the Engineer that the equipment is ready for operation, a yellow tag will be issued. The tag will be signed by the Engineer, or his assigned representative and attached to the equipment. The tag shall not be removed.
 - 4. Preliminary field tests, yellow tag, must be completed before equipment is subjected to final field tests, blue tag.
- D. Final Field Tests, Blue Tag

1. Upon completion of the above, and at a time approved by the Engineer, the equipment will be tested by operating it as a unit with all related piping, ducting, electrical and controls, and other ancillary facilities.
 2. The equipment will be placed in continuous operation as prescribed or required and witnessed by the Engineer or his assigned representative and the Owner or his assigned representative.
 3. The tests shall prove that the equipment and appurtenances are properly installed, meet their operating cycles and are free from defects such as overheating, overloading, and undue vibration and noise. Operating field tests shall consist of the following:
 - a. Check equipment for excessive vibration and noise as specified herein.
 - b. Check motor current draw under load conditions. The rated motor nameplate current shall not be exceeded.
 - c. Recheck alignment with dial indicators where applicable, after unit has run under load for a minimum of 24 hours.
- E. Additional field testing recommended by the manufacturer shall be performed at no cost to Owner.
- F. Until final field tests are acceptable to the Engineer, the Contractor shall make all necessary changes, readjustments, and replacements at no additional cost to the Owner.
- G. Upon acceptance of the field tests, a blue tag will be issued. The tag will be signed by the Engineer and attached to the unit. The tag shall not be removed, and no further construction work will be performed on the unit, except as required during start-up operations and directed by the Engineer.
- H. Defects which cannot be corrected by installation adjustments will be sufficient grounds for rejection of any equipment.
- I. All costs in connection with field testing of equipment such as lubricants, temporary instruments, labor, equipment, etc., shall be borne by the Contractor. Power, fuel, chemicals, water, etc. normally consumed by specific equipment shall be supplied by the Owner unless otherwise specified in the individual equipment specifications.
- J. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

- K. Field testing of electric motors shall be in accordance with Section 26 05 60 – Low-Voltage Electric Motors and Section 26 05 00, Basic Electrical Requirements.

3.07 VIBRATION TESTING

- A. Vibration testing shall be in accordance with Section 01 75 00 – Checkout and Startup Procedures.

3.08 FAILURE OF EQUIPMENT TO PERFORM

- A. Any defects in the equipment, or failure to meet the guarantees or performance requirements of the Specifications shall be promptly corrected by the Contractor by replacements or otherwise.
- B. If the Contractor fails to make these corrections, or if the improved equipment shall fail again to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order the Contractor to remove it from the premises at the Contractor's expense.
- C. The Contractor shall then obtain specified equipment to meet the contract requirements or upon mutual agreement with the Owner, adjust the contract price to reflect not supplying the specific equipment item.
- D. In case the Owner rejects said equipment, then the Contractor hereby agrees to repay to the Owner all sums of money paid to him for said rejected equipment on progress certificates or otherwise on account of the lump sum prices herein specified.
- E. Upon receipt of said sums of money, the Owner will execute and deliver to the Contractor a bill of sale of all his rights, title, and interest in and to said rejected equipment; provided, however, that said equipment shall not be removed from the premises until the Owner obtains from other sources other equipment to take the place of that rejected.
- F. Said bill of sale shall not abrogate Owner's right to recover damages for delays, losses, or other conditions arising out of the basic contract.

3.09 PAINTING

- A. Pump and motor shall be factory painted by the equipment manufacturer.
- B. All inaccessible surfaces of the equipment, which normally require painting, shall be finished painted by the manufacturer. The equipment and motor shall be painted with a high-quality epoxy polyamide semi-gloss coating specifically resistant to chemical, solvent, moisture, and acid environmental conditions, unless otherwise specified.

- C. Gears, bearing surfaces, and other unpainted surfaces shall be protected prior to shipment by a heavy covering of rust-preventive compound sprayed or hand applied which shall be maintained until the equipment is placed in operation. This coating shall be easily removable by a solvent.

3.10 WELDING

- A. The Equipment Manufacturer's shop welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirement of AWS D1.1 "Structural Welding Code - Steel" or AWS D1.2 "Structural Welding Code - Aluminum" of the American Welding Society, as applicable.
- B. The Contractor's welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirements of AWS D1.1 "Structural Welding Code - Steel" or AWS D1.2 "Structural Welding Code - Aluminum" of the American Welding Society, as applicable.
- C. The Contractor shall perform all field welding in conformance with the information shown on the Equipment Manufacturer's drawings regarding location, type, size, and length of all welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society, and special conditions, as shown by notes and details.

END OF SECTION

Exhibit 1

**Broward County Transportation Concurrency
Satisfaction Certificate – 0088498**



Broward County Transportation Concurrency Satisfaction Certificate

*** Please note that this approval does not constitute Environmental Review Approval. You will still need the Environmental Approval Certificate to submit to the Building Department.**

Issue Date: 03/22/2023

DR Review #: 0088498

Application Number: 000445016

Title of Drawings: Cooper City WWTP Effluent Pump Replacement

Project#: 56076

Plan Last Revision Date: 07-MAR-23

Bldg Dept Jurisdiction: Cooper City

Legal Description: Plat Name: COOPER CITY COMMUNITY SERVICE PLAT
Plat Number: 041-MP-94 Book: 161 Page: 25

Lot: **Block:**

Address: 11791 SW 49 ST, Cooper City, Fl. 33330

Construction Type: New Construction

This approval is issued in accordance with Sec. 27.66 of the Broward County Natural Resource Protection Code. This approval is specific for the plans and description described on this approval. Any changes in footprint, Lot #, or bedrooms or use will require a new approval.

Development Review

BUILDING OFFICIAL:

The replacement of a secondary effluent pump at the existing wastewater treatment plant.

-Cooper City - WWTP Effluent Pump Replacement

Receipt#: 0088498

TRANSPORTATION CONCURRENCY SATISFACTION:

Certificate is hereby issued

*Any revision to these plans requires a new development review by the division.

This application was routed in accordance with the Broward County Land Development Code, Chapter 5, Article IX, Section 5-181.

If a building permit is not applied for within 30 days of the Development and Environmental Review Approval, plans must be re-submitted to the Urban Planning Division for re-evaluation.

Development Reviewer Name: Monica Randino

Exhibit 2

**Broward County Environmental Review Approval
Certificate – 000445016**



Resilient Environment Department

URBAN PLANNING DIVISION

1 North University Drive, Building A, Box 102 Plantation, Florida 33324 954-357-6666 FAX 954-357-6521

Broward County Environmental Review Approval Certificate

Issue Date: 05/03/2023

ER Review #: 000445016

Title of Drawings: Cooper City WWTP Effluent Pump Replacement

Project#: 56076

Plan Last Revision Date: 07-MAR-23

Bldg Dept Jurisdiction: Cooper City

Legal Description: Plat Name: COOPER CITY COMMUNITY SERVICE P Lot:

Block:

Address: 11791 SW 49 ST, Cooper City, Fl. 33330

Construction Type: New Construction

This approval is issued in accordance with Sec. 27.66 of the Broward County Natural Resource Protection Code. This approval is specific for the plans and description described on this approval, any changes in footprint, Lot #, or bedrooms or use will require a new approval.

APPROVED

NO DEWATERING PERMITTED - CONTAMINATION In accordance with Section 27-353 of the Broward County Natural Resource Protection Code, dewatering operations shall not be conducted without approval from the Broward County Environmental Permitting Division.

WARNING Notification to the Urban Planning Division is required within ten (10) working days after issuance of a building permit, a certificate of occupancy, a temporary certificate of occupancy, certificate of completion, final inspection or any other action that allows occupancy of the building or facility. The building department is required to electronically update building permit and co data online at <https://dmdweb.broward.org/dmdweb/login.aspx>

COMMENTS WW-63118, The replacement of effluent pump #3 at the existing wastewater treatment plant.
-Cooper City - WWTP Effluent Pump Replacement

If a building permit is not applied for within 30 days of the Development and Environmental Review Approval, plans must be re-submitted to the Urban Planning Division for re-evaluation.

Environmental Reviewer Name: Mark Gerberding

Exhibit 3

**Broward County License for Construction to a
Wastewater Treatment Facility – WW-63118**



Resilient Environment Department
ENVIRONMENTAL PERMITTING DIVISION
 1 North University Drive, Mailbox 201, Plantation, Florida 33324-2038
 954-519-1483 Fax 954-519-1412

LICENSE FOR CONSTRUCTION TO A WASTE WATER TREATMENT FACILITY

APPLICANT:	RED LICENSE NO.:	WW-63118
Cooper City	EXPIRATION DATE:	05/01/2028
Attention: Raj Verma, Utilities Director, P.E.	DEP ID NO.:	COO #053154-000
11791 SW 49th Street	SEC-TWP-RNG:	25-50-40
Cooper City, FL 33330	PROJECT:	Cooper City Wastewater Treatment Plant Effluent Pump Replacement

This license is issued under the provisions of Chapter 27 of the Broward County Code of Ordinances, hereinafter called the Code. The above named-applicant, hereinafter called licensee, is hereby authorized to perform the work shown on the approved drawing(s), plans, documents, and specifications submitted by applicant and made a part hereof and described specifically below. Commencement of construction under this license shall be deemed acceptance of all conditions specified in the license. License conditions shall also be deemed to be accepted if they are not objected to in writing and received by RED within fourteen days of receipt of the license by the applicant.

The issuance of this license is a final agency determination. A person with a substantial interest may file a petition to request review of, or to intervene in a review of, a final administrative determination within 10 days of issuance of the license, subject to the provisions of Section 27-14 of the Code.

CONSTRUCTION TO: Install a higher head pump as Effluent Pump No. 3 and replace other miscellaneous appurtenances. The proposed pump's motor is rated at 250 horsepower, and it is replacing a 100-horsepower pump. Also, the new pump will be equipped with a variable frequency drive (VFD) to replace the decommissioned constant speed pump. The Effluent Pump operating point is 4,000 GPM @ 180' TDH.

SUBJECT TO GENERAL CONDITIONS #1- #11 and SPECIFIC CONDITIONS # 1 - # 3.

In accordance with: Plans, Sheets G-01 thru G-04, C-01, C-02, M-01 thru M-03, S-01 thru S-03, and E-01 thru E-10 (Received 03/13/2023). Hazen and Sawyer, P.C. Project #: 4679-004. None Attached.

Located at: 11791 SW 49TH ST, Cooper City, FL 33330

Serving: Wastewater Treatment Plant Modification. No Additional Flow.

Issued this 2nd day of May, 2023.

Resilient Environment Department
 Prepared by Ryan Flaherty


 Digitally signed by YVEL ROCHER
 Date: 2023.05.02 09:43:59 -04'00'
 Yvel Rocher, P.E., Environmental Program Manager
 Domestic Wastewater Program

ec: FDEP/WPB
 Asif Ali, PDMD Front Desk
 George A. Brown, P.E., Hazen and Sawyer, P.C.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and must be completed by the licensee and are enforceable by RED pursuant to the Code. RED will review this license periodically and may revoke or suspend the license, and initiate administrative and/or judicial action for any violation of the conditions by the licensee, its agents, employees, servants or representatives.
2. This license is valid only for the specific uses set forth in the license application and any deviation from the approved uses may constitute grounds for revocation, suspension, and/or enforcement action by RED.
3. In the event the licensee is temporarily unable to comply with any of the conditions of the license or with the Code, the licensee shall notify RED within eight (8) hours or as stated in the specific section of the Code. Within three (3) working days of the event, the licensee shall submit a written report to RED that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention regarding the repair, replacement and reconstruction of destroyed facilities and a schedule of events leading toward operation with the license condition.
4. The issuance of this license does not convey any vested rights or exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, or any violation of federal, state or local laws or regulations.
5. This license must be available for inspection on the licensee's premises during the entire life of the license.
6. By accepting this license, the licensee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this licensed facility or activity, that are submitted to the County, may be used by the County as evidence in any enforcement proceeding arising under the Code, except where such use is prohibited by Section 403.111, F.S.
7. The licensee agrees to comply and shall comply with all provisions of the most current version of the Code.
8. Any new owner or operator of a licensed facility shall apply by letter for a transfer of license within thirty (30) days after sale or legal transfer. The transferor shall remain liable for performance in accordance with the license until the transferee applies for and is granted a transfer of license. The transferee shall be liable for any violation of the Code that results from the transferee's activities. The transferee shall comply with the transferor's original license conditions when the transferee has failed to obtain its own license.
9. The licensee, by acceptance of this license, specifically agrees to allow access and shall allow access to the licensed source, activity or facility at times to RED personnel for the purposes of inspection and testing to determine compliance with this license and the Code.
10. This license does not constitute a waiver or approval of any other license, approval, or regulatory requirement by this or any other governmental agency that may be required.
11. Enforcement of the terms and provisions of this license shall be at the reasonable discretion of RED, and any forbearance on behalf of RED to exercise its rights hereunder in the event of any breach by the licensee, shall not be deemed or construed to be a waiver of RED's rights hereunder.

SPECIFIC CONDITIONS:

1. This license is valid for construction of a sewage collection/transmission system and/or a reuse distribution system, or a WWTP modification only. All connections to the system must be approved by RED prior to the issuance of a building permit.
2. Any deviation from approved plans and/or specifications affecting capacity, flow, or operation of components shall be submitted to and approved by the RED before such changes are made.
3. The applicant shall be responsible for supplying as-built or record drawing(s) to RED upon completion of the project. Such drawing(s) shall be signed and sealed by an Engineer registered in the State of Florida and be based on accurate records maintained by the Engineer or by a Land Surveyor currently registered in the State of Florida. Drawing(s) shall indicate locations and elevations of all pipe lines, manholes, pump stations and appurtenances installed under this project's license. Connection to the new system shall not be approved until the as-built (or record) drawing(s), certification documentation, and fees have been provided to and approved by RED.

Exhibit 4

**FDEP Minor Revision to a Wastewater Facility or
Activity Permit – FL0040398**



FLORIDA DEPARTMENT OF Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, Florida 33406-3007

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

March 27, 2023

In the Matter of an
Application for Permit by:

City of Cooper City
Raj Verma, Director
Utility Systems Department
11791 SW 49th St
Cooper City, Florida 33330-4447
954) 434-5519
RVerma@CooperCity.gov

File Number: FL0040398-014-DW1-MR
Project Name: Effluent Pump Replacement
County: Broward
Facility: City of Cooper City West WWTP
Permit Number: FL0040398

NOTICE OF PERMIT REVISION

ISSUANCE DATE: March 27, 2023
EFFECTIVE DATE: March 27, 2023
EXPIRATION DATE: January 25, 2028

Dear Mr. Verma,

The Department has reviewed your application received on March 10, 2023, to revise the existing Wastewater Permit Number FL0040398, issued on January 26, 2023, for the referenced facility modification. Based on the Basis of Design Report, prepared by Hazen and Sawyer, The Department hereby approves your request in accordance with Section 403.087, Florida Statutes.

Please note that the effective date of this permit is also the issuance date of this notice March 27, 2023

Please note that the expiration date of this permit is not being revised. The expiration date remains January 25, 2028.

There are no changes to the existing discharge monitoring report (DMR).

The proposed modification includes the following:
Proposed effluent Vertical Turbine pump with a maximum operating capacity of 4,000 gpm at 180 feet TDH along with all necessary electrical and controls will replace an existing effluent pump # 3.

The permit is modified as given below:

- Add the section 2 to Part VI. Schedules:

2. The effluent pump # 3 replacement will be constructed according to the following schedule:

ITEM NUMBER	Improvement Action	Completion Date
a.	Start construction	September 25, 2023
b.	Complete construction	September 25, 2024
b.	Submit DEP Form Number 62-620.910(12), Notification of Completion of Construction for Wastewater Facilities or Activities (Revised 10/23/00) (You can find the form at Web Site: https://floridadep.gov/sites/default/files/62-620.910_12.pdf)	Prior to placing into service
c.	Submit DEP Form Number 62-620.910(13), Notification of Availability of Record Drawings and Final Operation and Maintenance Manuals (Revised 10/23/00) (You can find the form at Web Site: https://floridadep.gov/sites/default/files/62-620.910_13.pdf)	Within 6 months of submittal of the Notification of Completion

All other applicable conditions included in the original permit and other permit revisions remain unchanged. This Notice of Permit Revision shall become a part of the permit and shall be attached to the original permit.

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes, within fourteen days of receipt of notice. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Under Rule 62-110.106(4), Florida Administrative Code, a person may request enlargement of the time for filing a petition for an administrative hearing. The request must be filed (received by the clerk) in the Office of General Counsel before the end of the time period for filing a petition for an administrative hearing.

Petitions by the applicant or any of the persons listed below must be filed within fourteen days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within fourteen days of publication of the notice or within fourteen days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within fourteen days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within fourteen days of receipt of notice shall constitute a

Raj Verma

Utility Systems Department

waiver of that person’s right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petition that disputes the material facts on which the Department’s action is based must contain the following information:

- (a) The name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner’s representative, if any; the Department permit identification number and the county in which the subject matter or activity is located;
- (b) A statement of how and when each petitioner received notice of the Department action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department action;
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
- (f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department’s final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573, Florida Statutes, is not available for this proceeding.

This permit action is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this permit will not be effective until further order of the Department.

Any party to the permit has the right to seek judicial review of the permit action under Section 120.68, Florida Statutes, by the filing of a notice of appeal under Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399 3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when this permit action is filed with the clerk of the Department.

Executed in Orlando, Florida.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

 for

March 27, 2023

Norva Blandin, MSEM
Permitting Program Administrator
Southeast District

Date

NB/MD/ls: FL0040398-014-DW1-MR

CERTIFICATE OF SERVICE

The undersigned hereby certifies that this NOTICE OF PERMIT REVISION were emailed before the close of business on March 27, 2023, to the listed persons.

DEP/SED: Norva Blandin, Margie DeBerry, Lyudmila Sokolova, Brigitte Bucell
George A. Brown, Hazen and Sawyer, gbrown@hazenandsawyer.com

FILING AND ACKNOWLEDGMENT

FILED, on this date, under Section 120.52, Florida Statutes, with the designated Deputy Clerk, receipt of which is hereby acknowledged.



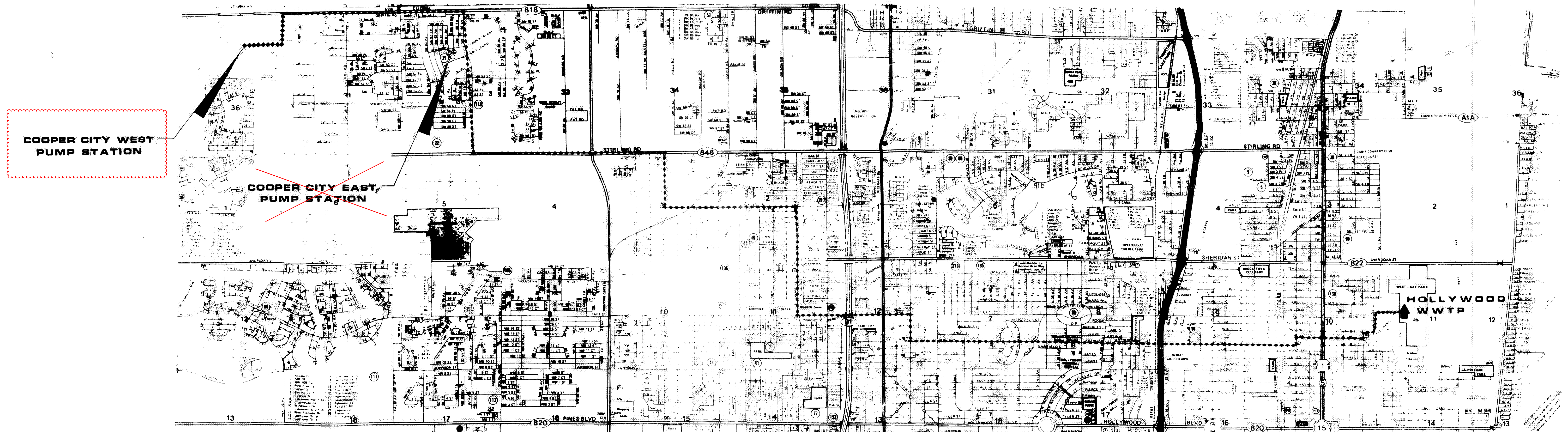
Clerk

March 27, 2023

Date

EFFLUENT TRANSMISSION FORCE MAIN, FOR TOWN OF DAVIE & COOPER CITY, FLA.

D.E.R. PROJECT NUMBER 813010



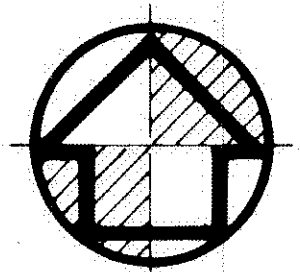
LOCATION MAP

SCALE: 1" = 2400'

COOPER CITY PUMP STATIONS

PREPARED BY:

JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC.



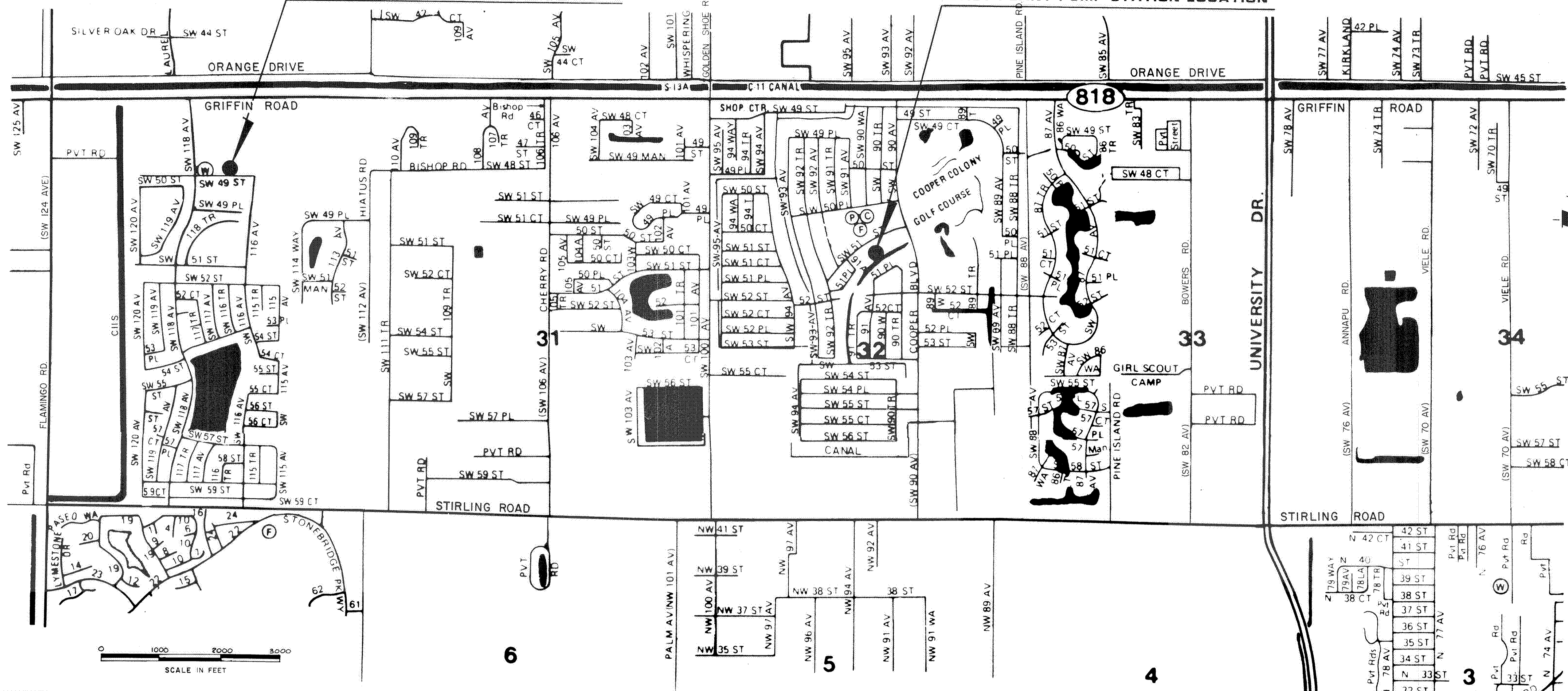
Issued For
Informational Purposes

FEBRUARY, 1986

RECORD DRAWING

WEST PLANT PUMP STATION LOCATION

EAST PLANT PUMP STATION LOCATION



INDEX

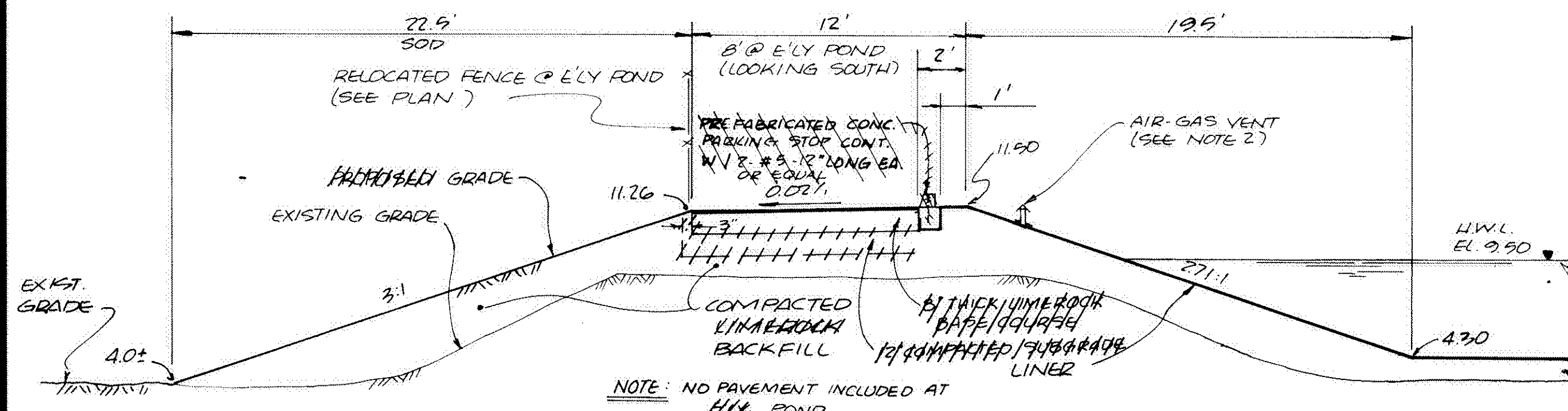
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1	COVER SHEET
2	INDEX AND LOCATION
3	WEST PLANT PUMP STATION - SITE PLAN AND SECTIONS
4	WEST PLANT PUMP STATION
5	WEST PLANT PUMP STATION - GENERATOR AND CONTROL BUILDING
6	EAST PLANT PUMP STATION - SITE PLAN AND DETAILS
7	EAST PLANT PUMP STATION
8	EAST PLANT PUMP STATION - GENERATOR AND CONTROL BUILDING
9	STRUCTURAL DETAILS
10	WEST PLANT PUMP STATION - HOLDING POND DETAILS
11	MISCELLANEOUS DETAILS
12	WEST PLANT PUMP STATION - ELECTRICAL PLAN
13	WEST PLANT PUMP STATION - GENERATOR AND CONTROL BUILDING ELECTRICAL PLAN
14	EAST PLANT PUMP STATION - ELECTRICAL PLAN
15	EAST & WEST PLANT PUMP STATIONS - ELECTRICAL SCHEMATICS
16	EAST & WEST PLANT PUMP STATIONS - CONTROL PANEL

Issued For
Informational Purposes

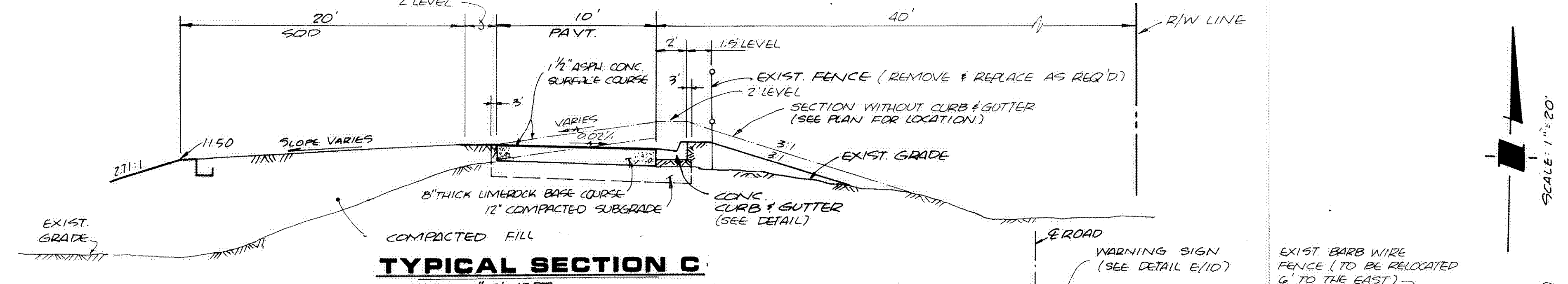
RECORD DRAWING

TOWN OF DAVIE AND COOPER CITY, FLORIDA COOPER CITY PUMP STATIONS LOCATION MAP AND INDEX		SHEET 2 OF 16 SHEETS	
SCALE: AS SHOWN	DESIGNED: KY DRAWN: AS CHECKED: B.H.C.	SUBMITTED: <i>Ben A. Chen</i> 3/18/89 9-4-85 PROJECT ENGINEER RECOMMENDED: <i>Blanca...</i> 12/14 3/4/85 DATE	JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. 5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

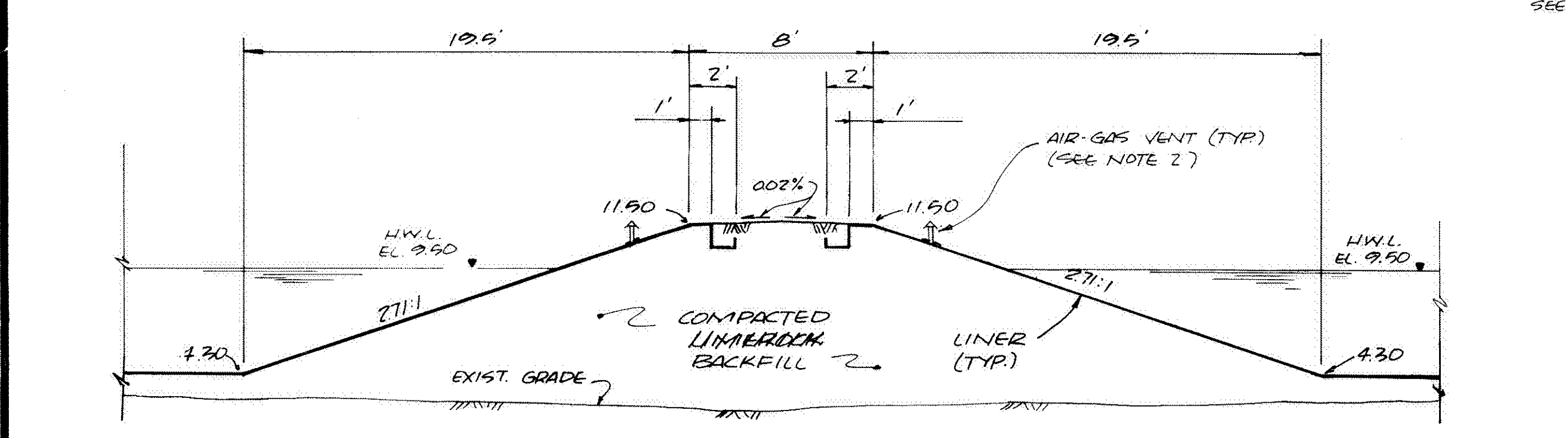
JOB NO. FILE DATE



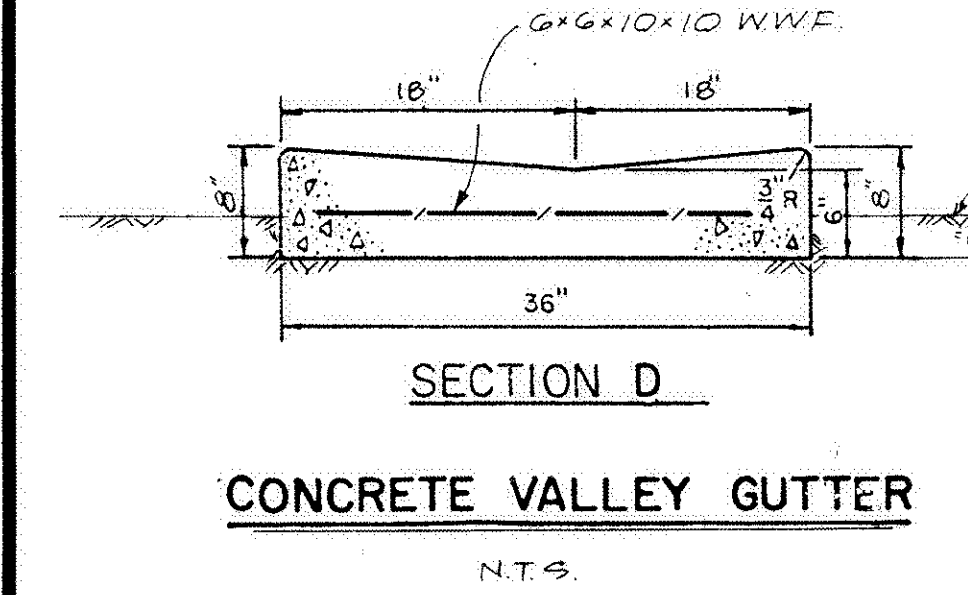
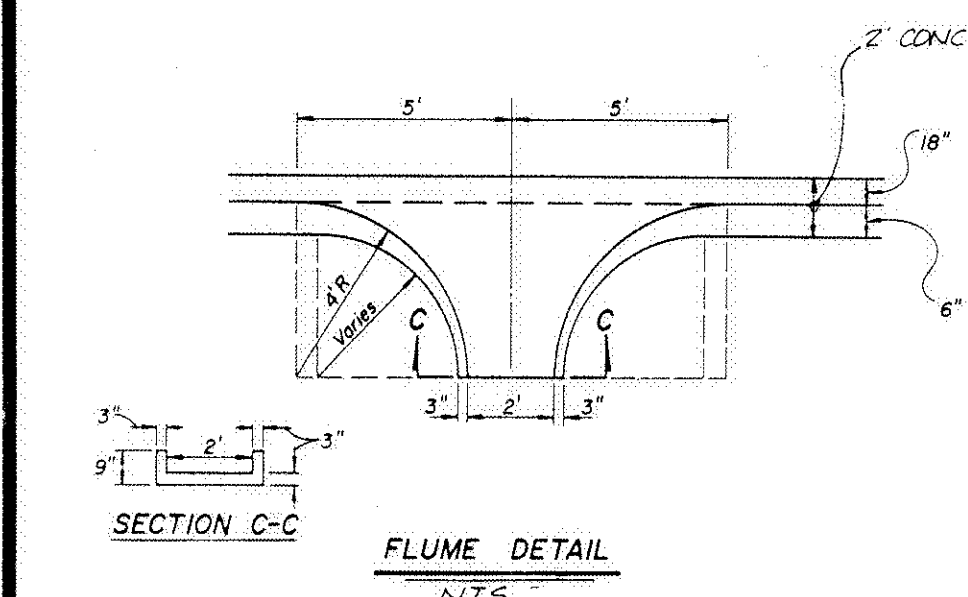
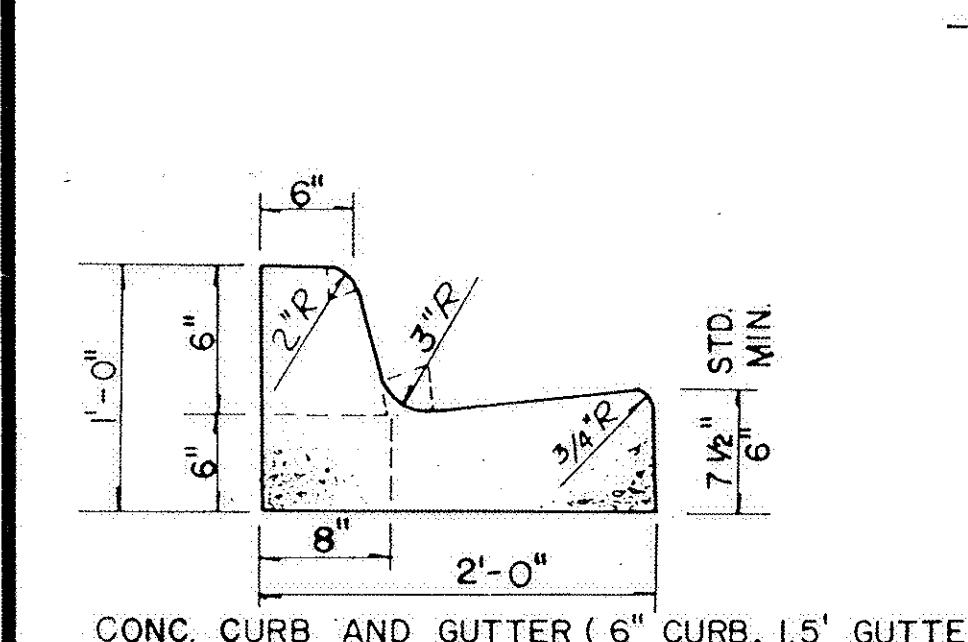
TYPICAL SECTION A
SCALE: 1" = 5' VERT.
1" = 5' HORIZ.



TYPICAL SECTION C
SCALE: 1" = 5' VERT.
1" = 5' HORIZ.



TYPICAL SECTION B
SCALE: 1" = 5' VERT.
1" = 5' HORIZ.

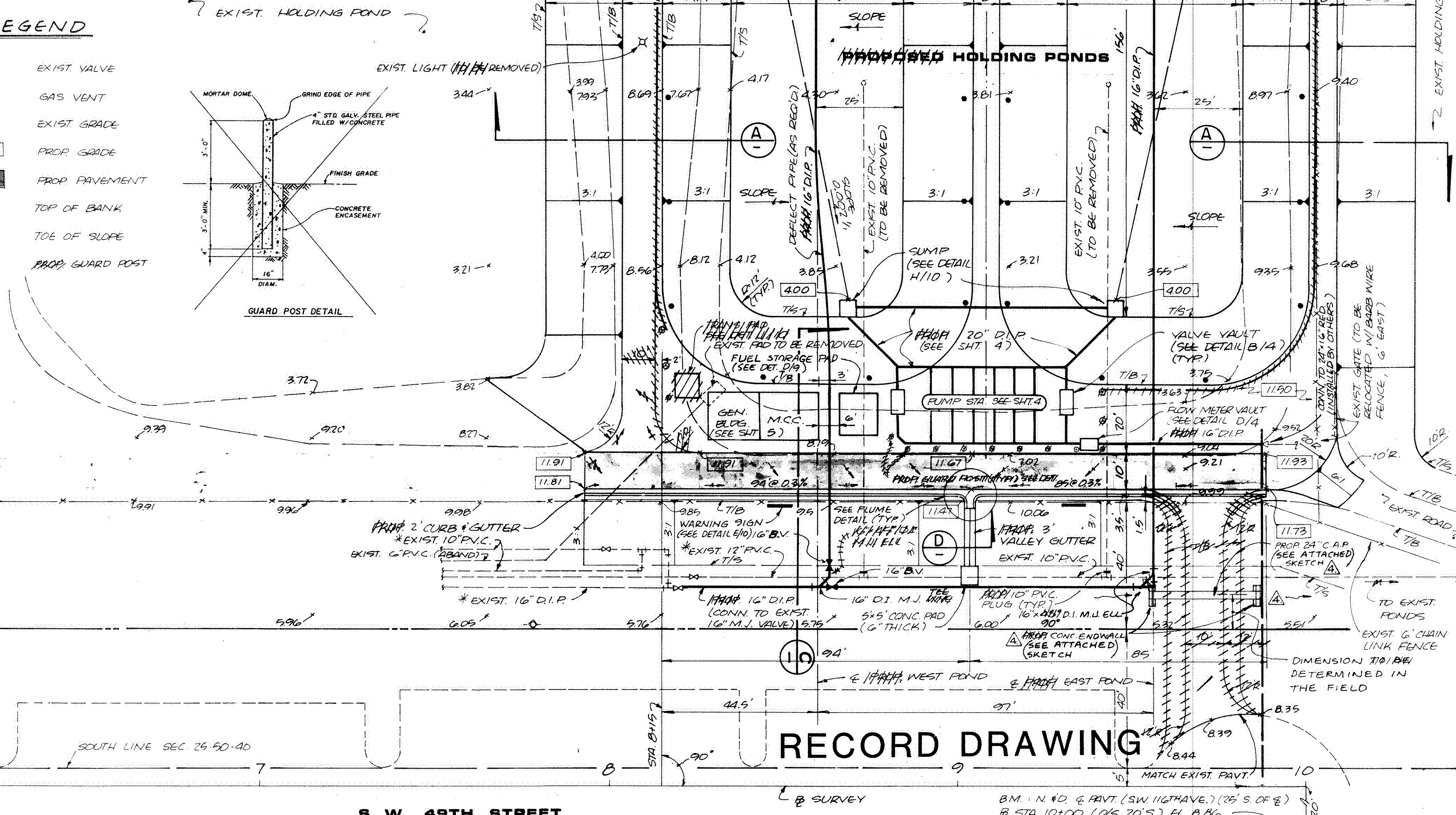
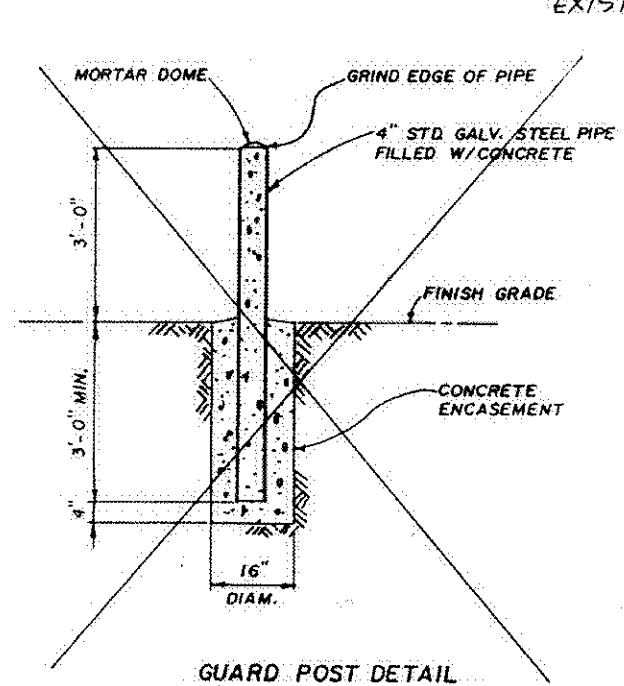


NOTE: 1. FOR LINER DETAILS SEE SHT. 10.
2. PROVIDE GAS VENTS ON ALL SLOPES COVERED W/ LINER - 30' C. TO C. (TYP) SEE DETAIL A/10, D/10.

*NOTE: 1. EXIST. TREATED CHLORINATED EFFLUENT MAINS. CHLORINATION OF EFFLUENT PERFORMED AT SEWAGE TREATMENT UNIT CHLORINE CONTACT ZONE.
2. SHADED AREAS DEPICT NEW PAVEMENT.

LEGEND

- ⊗ EXIST. VALVE
- GAS VENT
- ⊙ EXIST. GRADE
- 11.90 PROP. GRADE
- ▨ PROP. PAVEMENT
- T/B TOP OF BANK
- T/S TOE OF SLOPE
- PROP. GUARD POST



Issued For Informational Purposes

RECORD DRAWING

REV	DATE	BY	DESCRIPTION
5/20/85	2/13	JAC	RECORD DRAWING
7/30/85	1/16	DPA	MODIFY ENTRANCE ROAD (SEE ATTACHED SKETCH)
9/30/85	1/16	AS	HOLDING POND ELEVATION REVISIONS
11/30/85	1/16	AS	MISC. REVISIONS
3/28/86	1/16	CFR	GENERAL REVISION

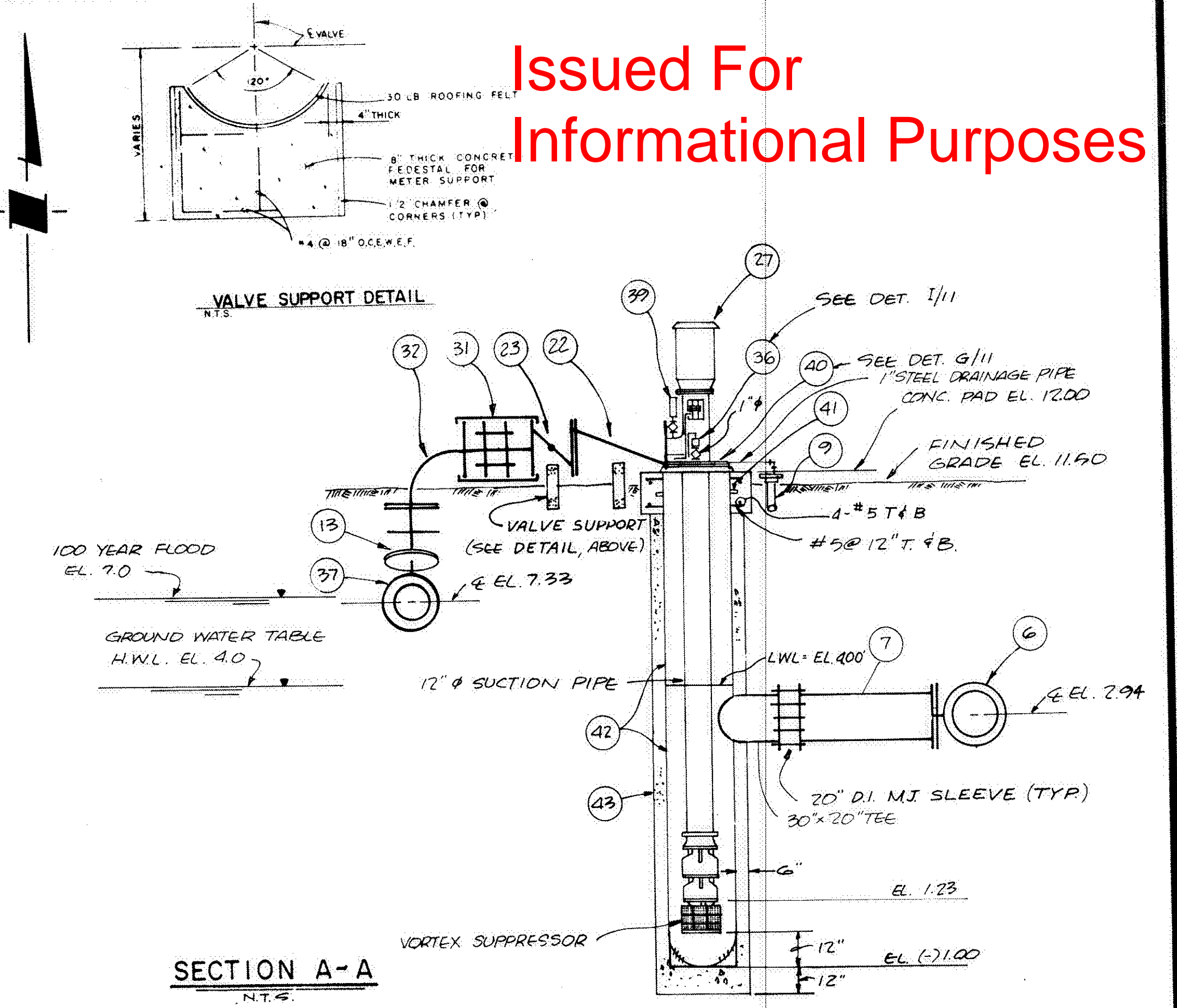
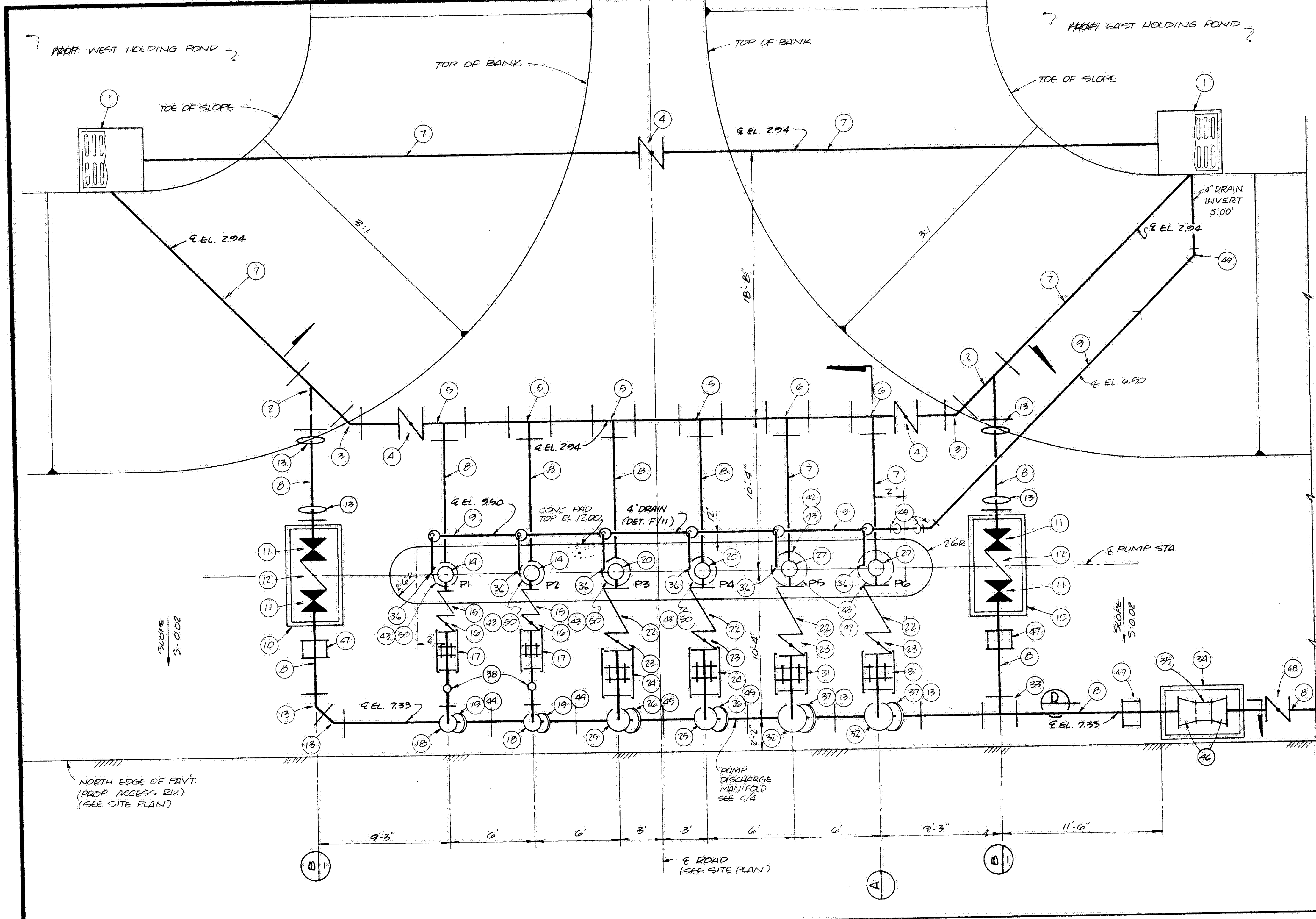
SCALE:	1" = 20'
DESIGNED:	JAC
DRAWN:	D.P.R.
CHECKED:	B.H.C.

SUBMITTED:	Ben A. Chen	3/18/85	9-4-85
PROJECT ENGINEER:		R.C.E. NO.	DATE
RECOMMENDED BY:	Blair H. Hays	1/17/85	2/4/85
		R.C.E. NO.	DATE

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.
5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
WEST PLANT, PUMP STATION
SITE PLAN & SECTIONS

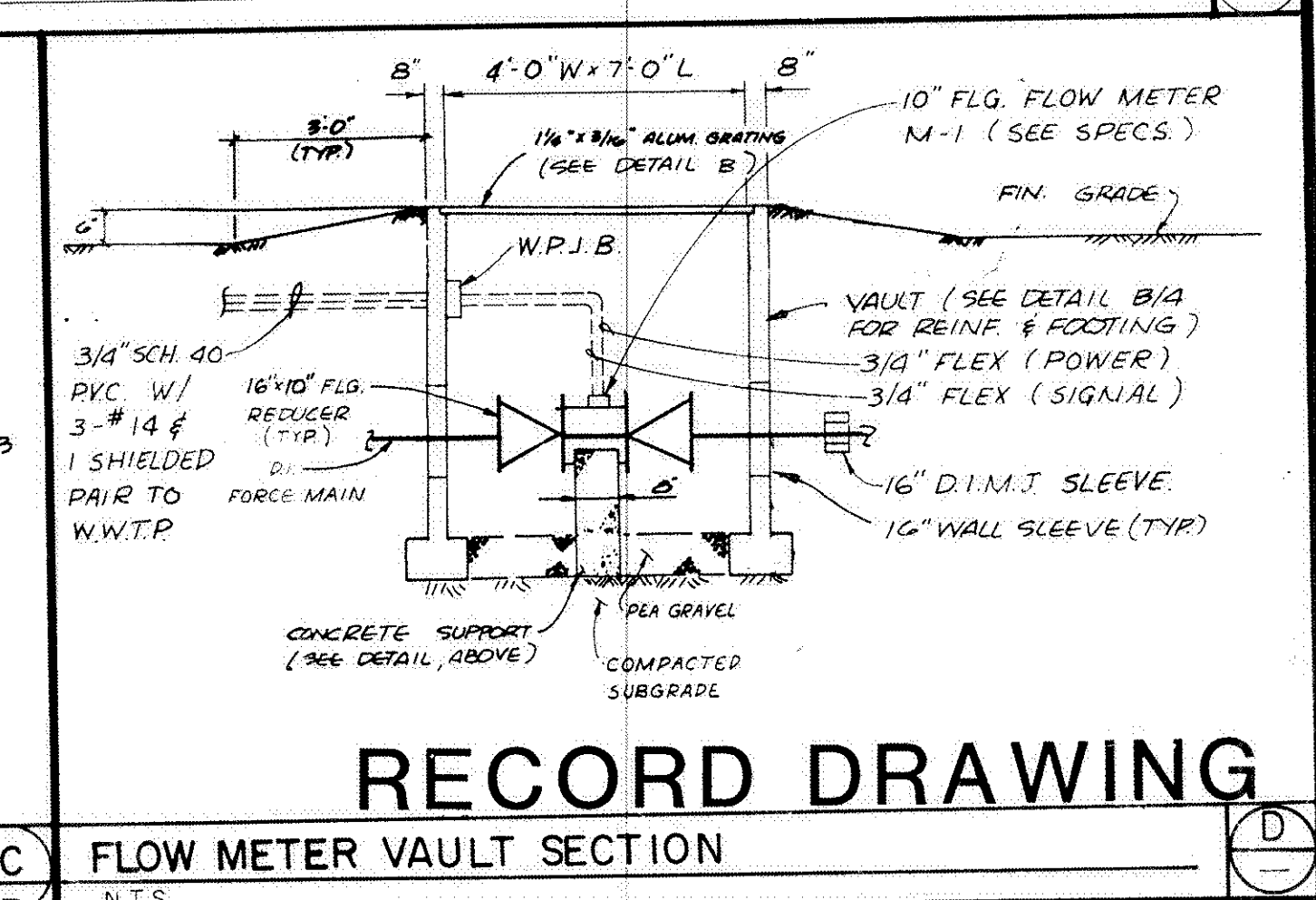
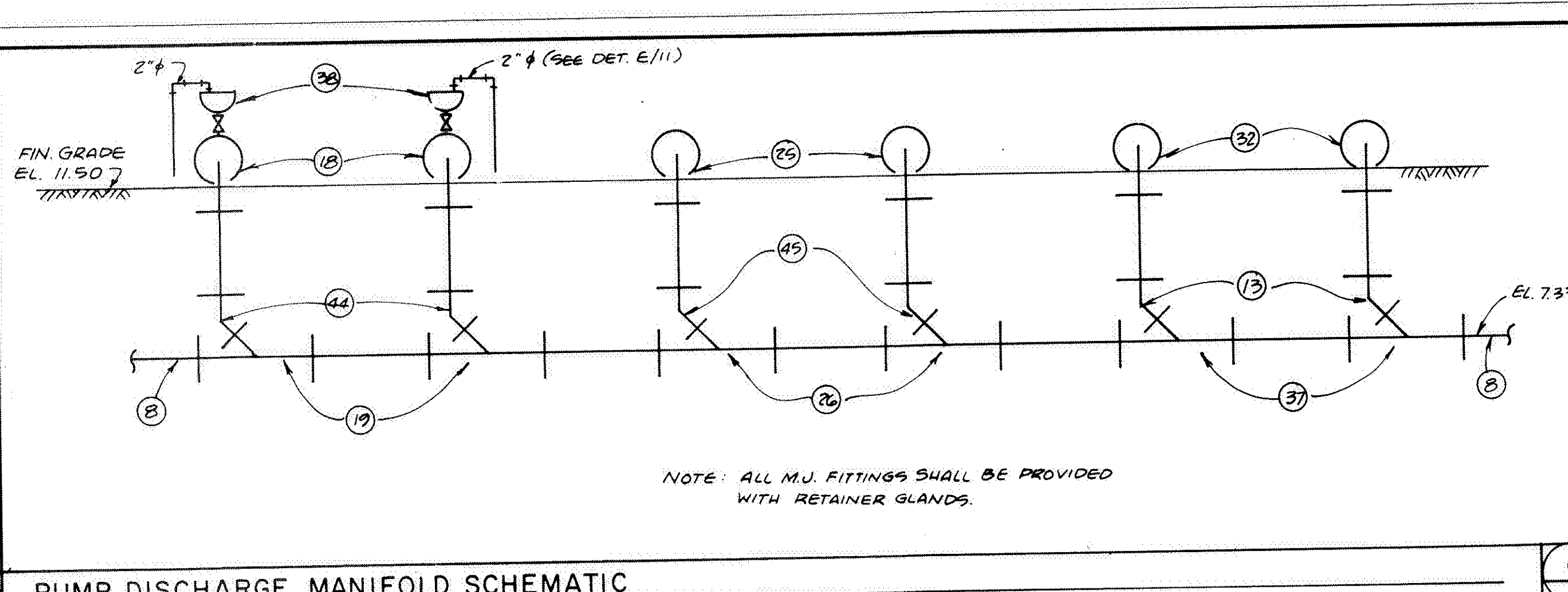
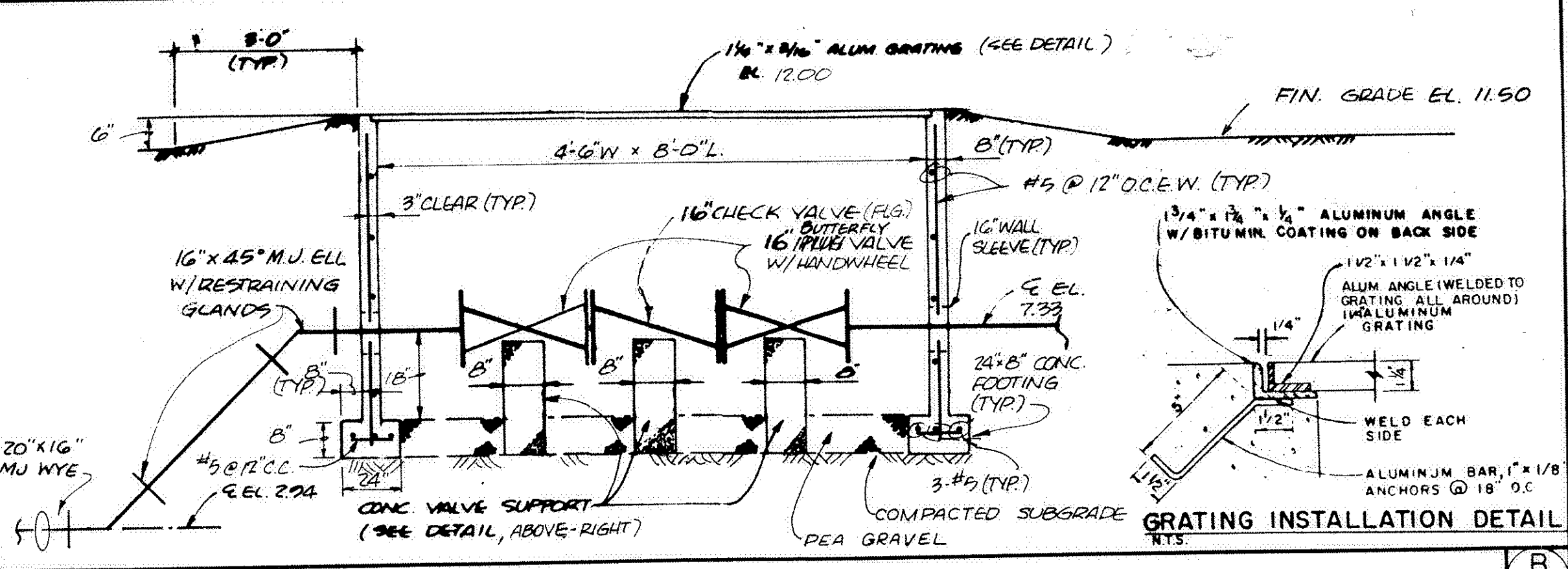
SHEET **3** OF 16 SHEETS



MECHANICAL INDEX

1	Sump (See Detail K/A)	17	8" Sleeve Coupling with Harness	34	Meter Vault (See Detail D/4)
2	20" x 16" Wye (MJ)	18	12" x 8" L.R. 90° Red. Bend (FL)	35	10" FLG. Magnetic Flow Meter, M-1 (See Specs)
3	20" x 45° Bend (MJ-PE)	19	16" x 12" Wye (MJ)	36	1" Air Release and Vacuum Valve
4	20" Butterfly Valve (MJ)	20	20" x 16" Tee (MJ)	37	16" x 12" Wye (MJ)
5	20" x 16" Tee (MJ)	21	14" x 12" Red. (FLG.)	38	2" Air Release & Vacuum Valve See E/11
6	20" x 20" Tee (MJ)	22	17" Check Valve (FLG.)	39	Pressure Gauge
7	20" D.I.P., Class 51	23	12" Butterfly Valve (FLG.) w/Elec. Operator	40	Pump Barrel Flange
8	16" D.I.P., Class 51	24	12" Sleeve Coupling with Harness	41	Wall Flange 3" x 1/4" THICK
9	4" C.I.P., Class 51	25	12" L.R. Bend (FLG.)	42	Steel Pump Barrel 30" Dia., 1/4" Thick
10	Meter Vault (See Detail B/4)	26	16" x 12" Wye (MJ-PE)	43	6" Concrete Encasement (TYP)
11	16" Butterfly Valve (FLG.) with Hand Wheel	27	16" x 14" Red. (FLG.)	44	12" x 45° Bend (MJ-PE)
12	16" Check Valve (FLG.)	28	12" Check Valve	45	12" x 45° Bend (MJ-PE)
13	12" x 45° Bend (MJ-PE)	29	12" Butterfly Valve (FLG.) w/Elec. Operator	46	16" x 10" FLG. Red
14	Pump (See Specs) P1 & P2	30	12" Sleeve Coupling with Harness	47	16" MJ D.I. Sleeve
15	8" Check Valve (FLG.)	31	12" Sleeve Coupling with Harness	48	16" Butterfly Valve, M.J.
16	8" Butterfly Valve (FLG.) w/Elec. Operator	32	12" - 90° L.R. Bend (Flg.)	49	4" x 45° Bend
		33	16" Tee (MJ)	50	MOTOR LINED STL. PUMP BARREL 24" Ø, 1/4" THICK

WEST PLANT PUMP STATION AND PUMP SECTION
SCALE: 1" = 4'



VALVE VAULT SECTION
NTS

PUMP DISCHARGE MANIFOLD SCHEMATIC
NTS

FLOW METER VAULT SECTION
NTS

REV	DATE	BY	DESCRIPTION
2	9/28/85	ALA	RECORD DRAWING
1	2/28/85	DZR	GENERAL REVISION

SCALE:	DESIGNED:	SUBMITTED:	DATE:
AS SHOWN	J.A.C.	3/8/85	9-4-85
	DRAWN:	PROJECT ENGINEER:	R.C.E. NO.
	D.P.R.	RECOMMENDED:	17/41
	CHECKED:		9/4/85
	J.A.C.		

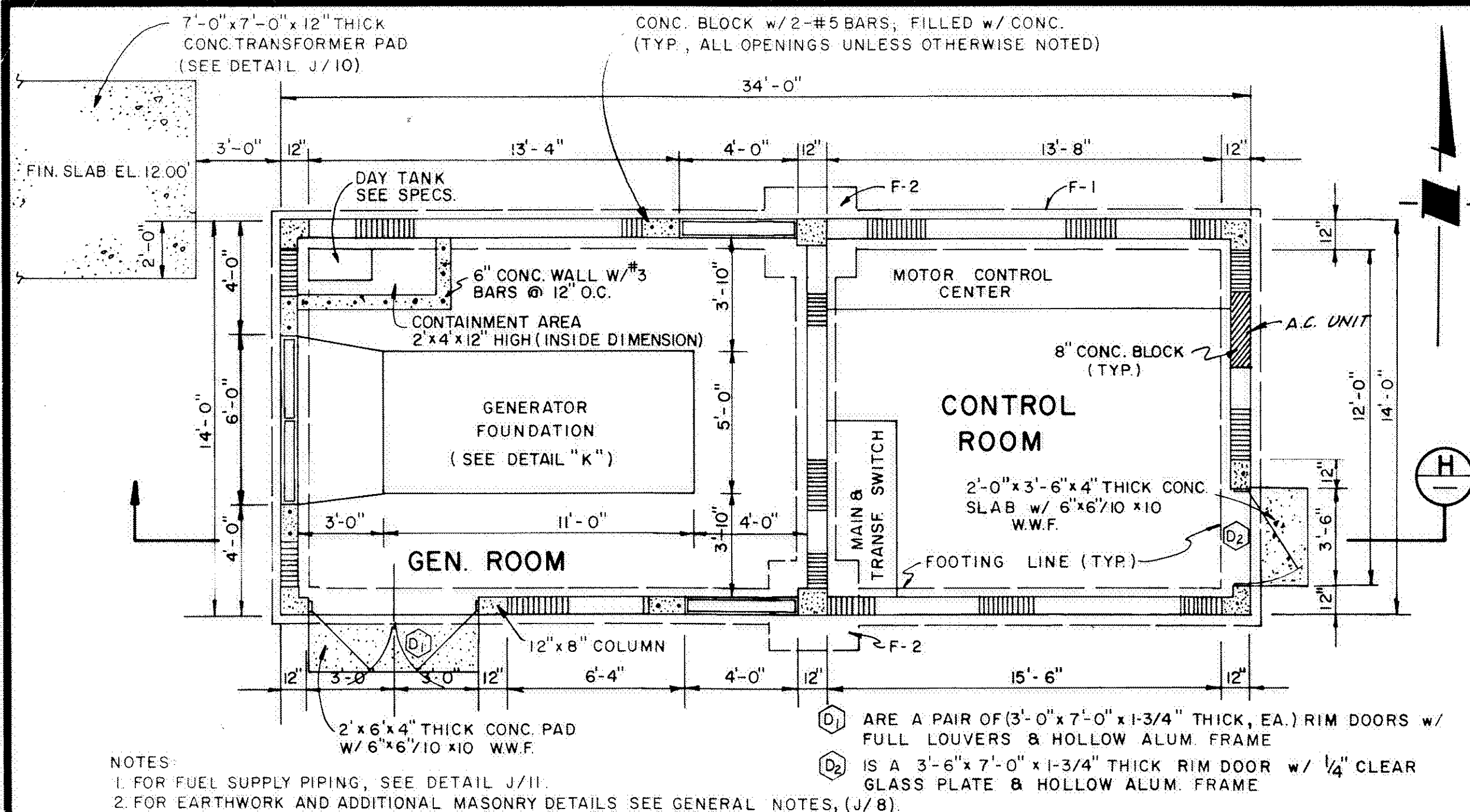
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

5075 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

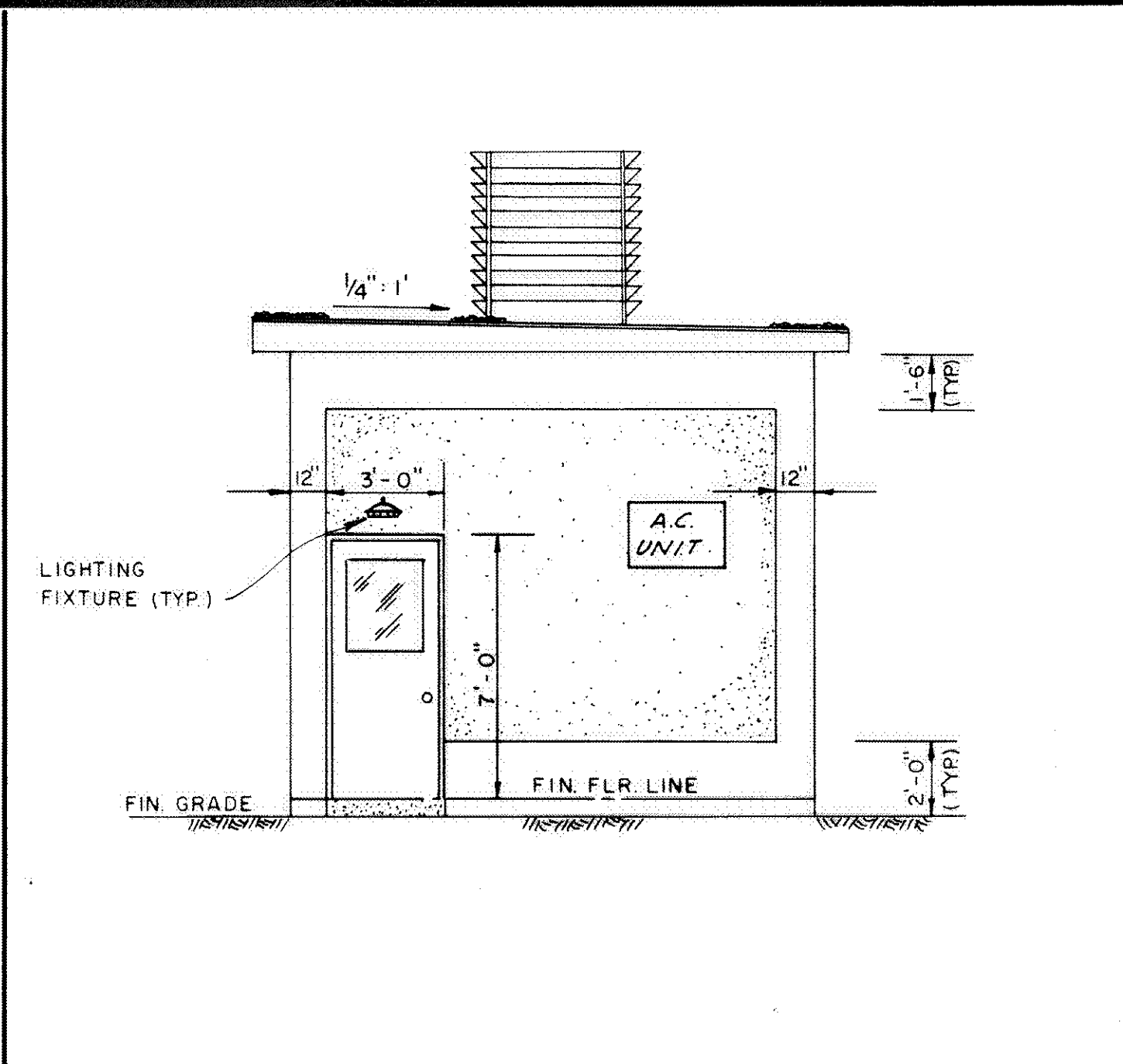
TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
WEST PLANT PUMP STATION

SHEET 4 OF 16 SHEETS

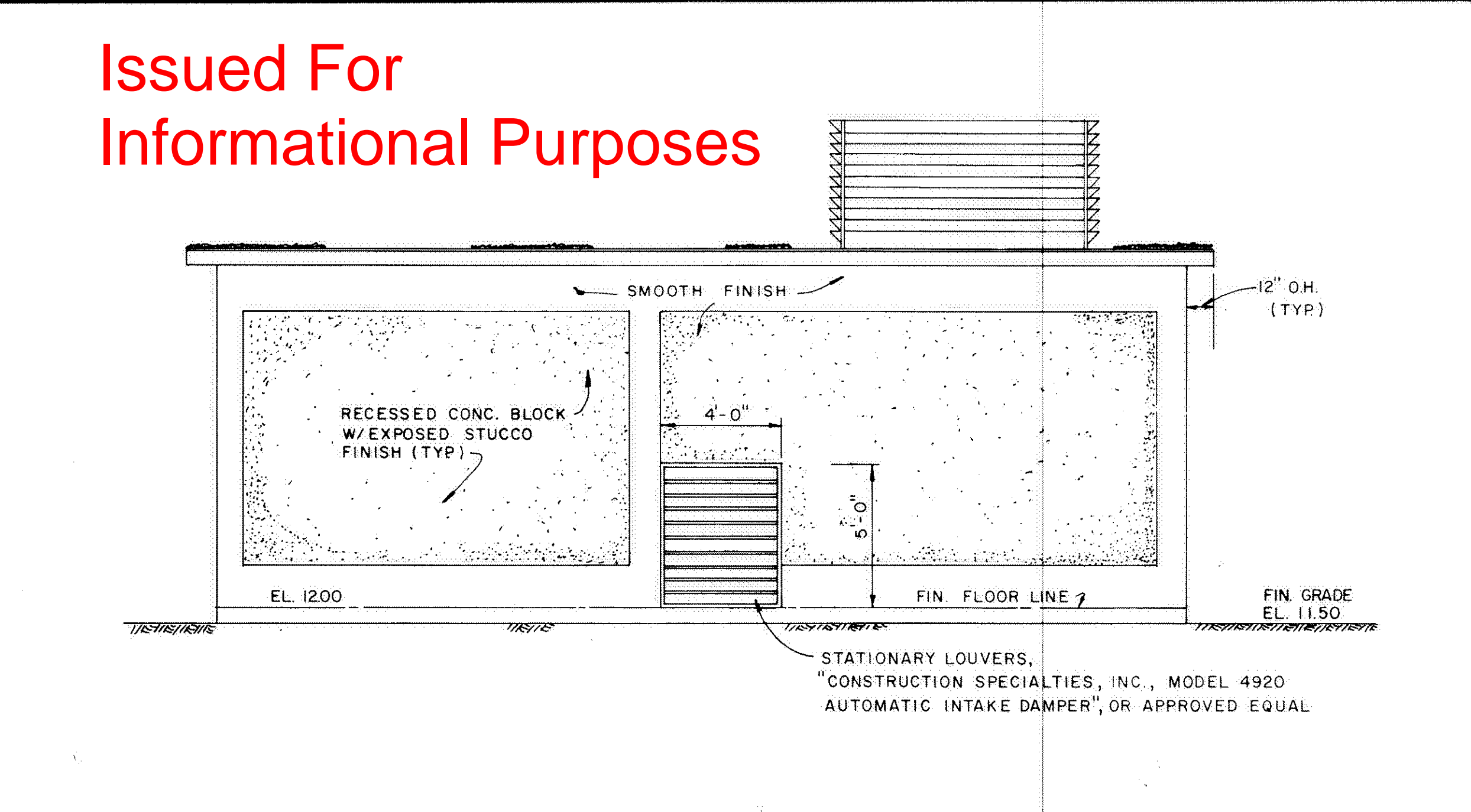
Issued For
Informational Purposes



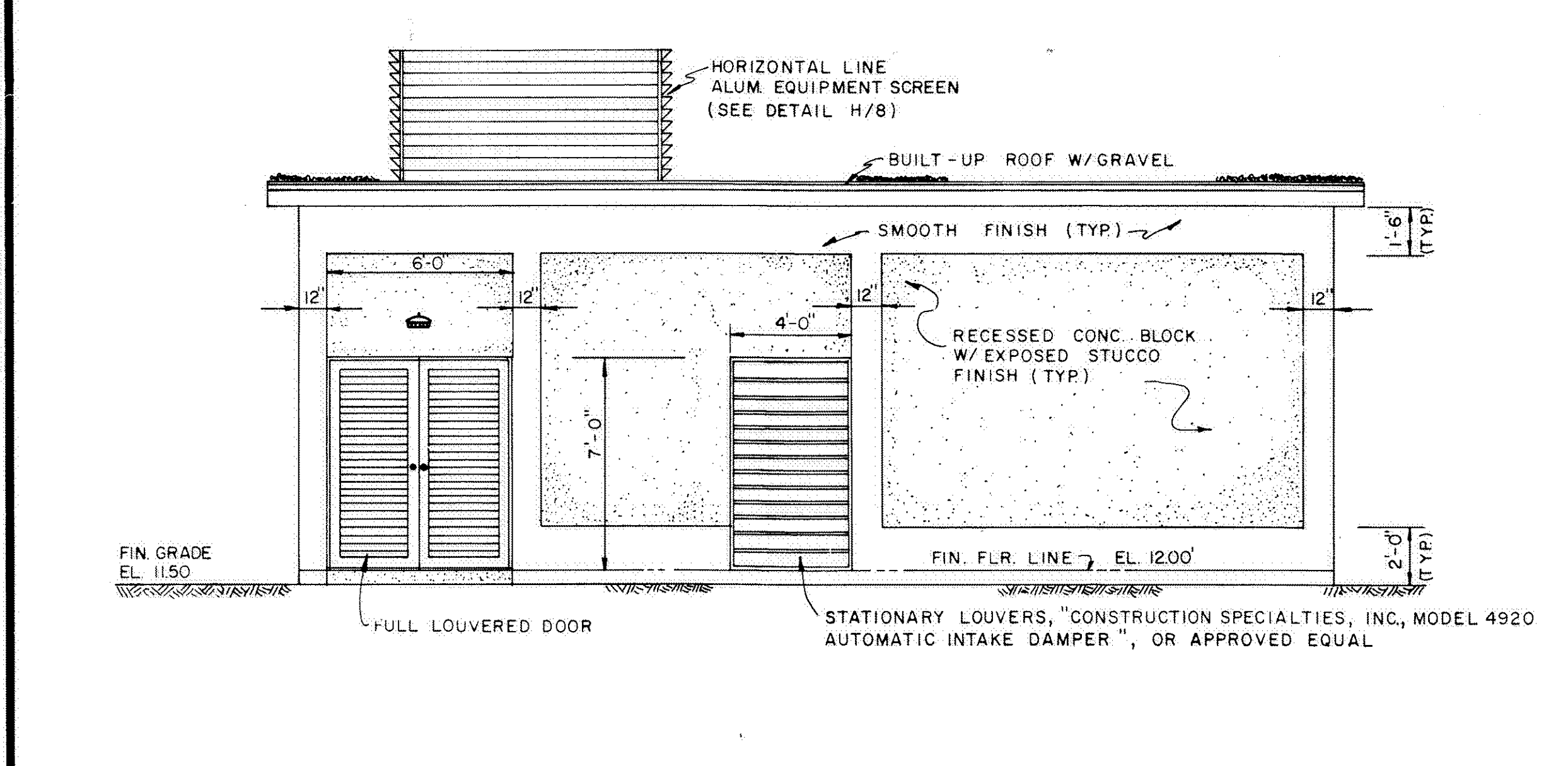
PLAN
SCALE: 1/4" / 1'-0"



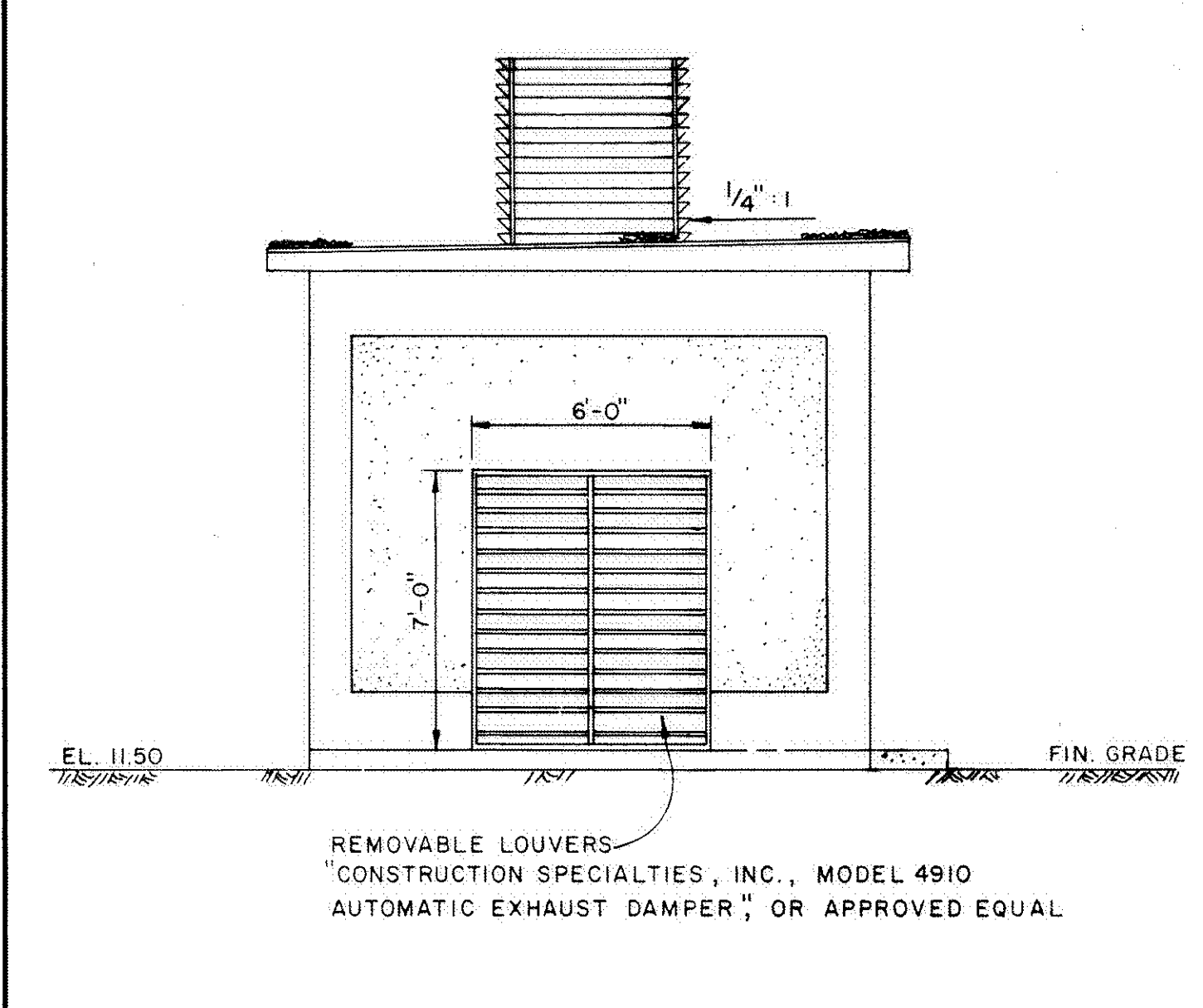
EAST ELEVATION
SCALE: 1/4" / 1'-0"



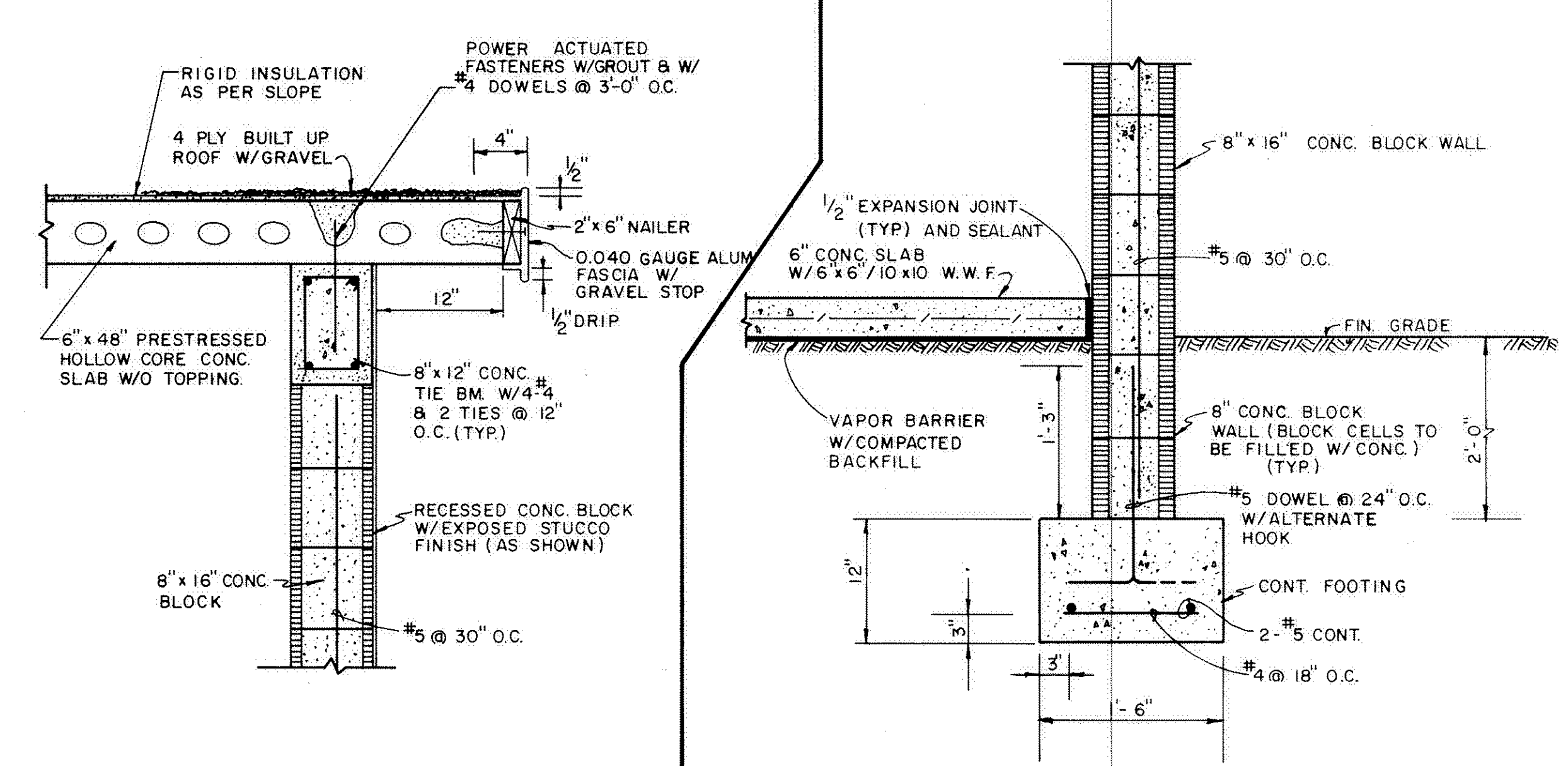
NORTH ELEVATION
SCALE: 1/4" / 1'-0"



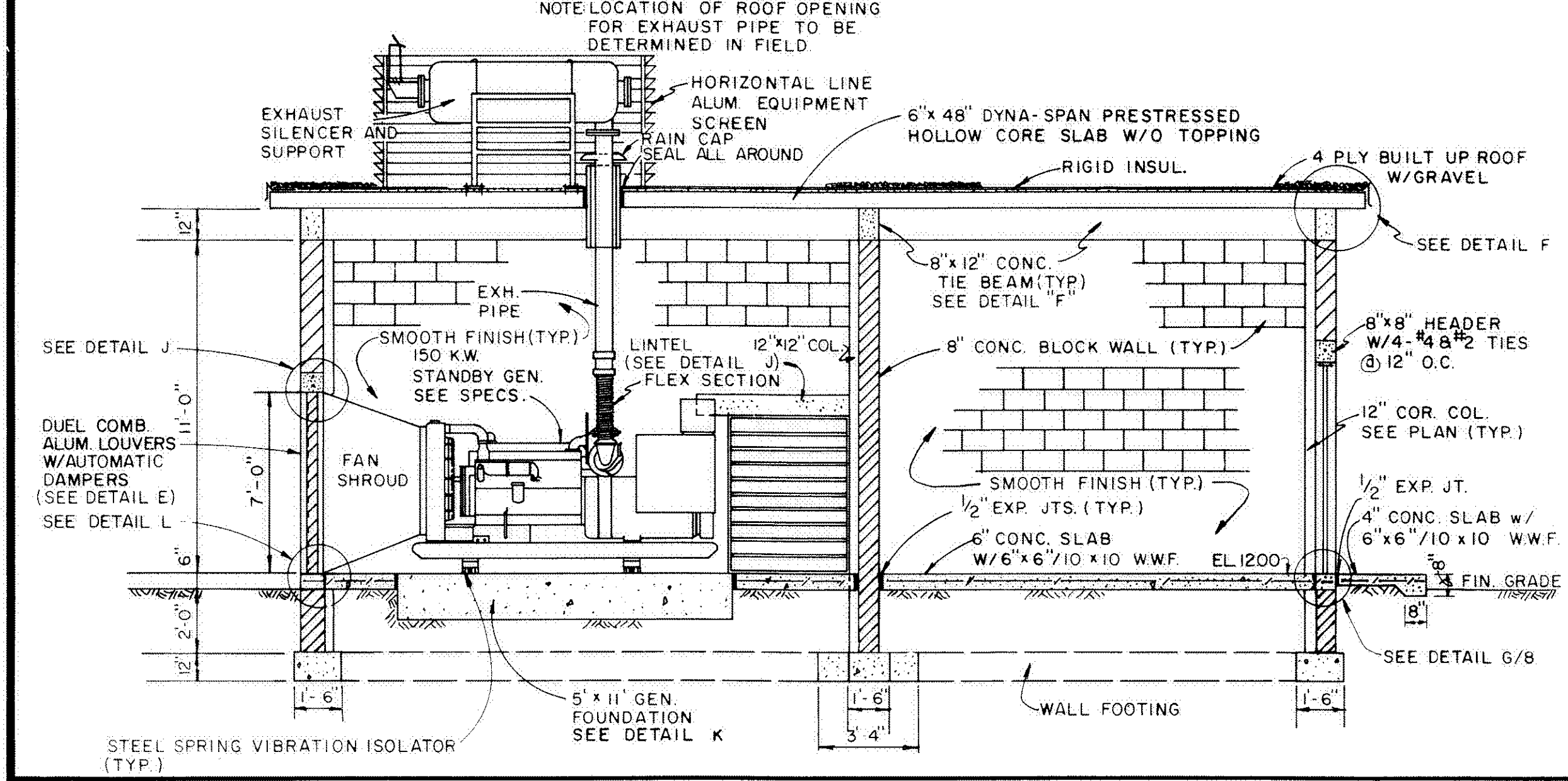
SOUTH ELEVATION
SCALE: 1/4" / 1'-0"



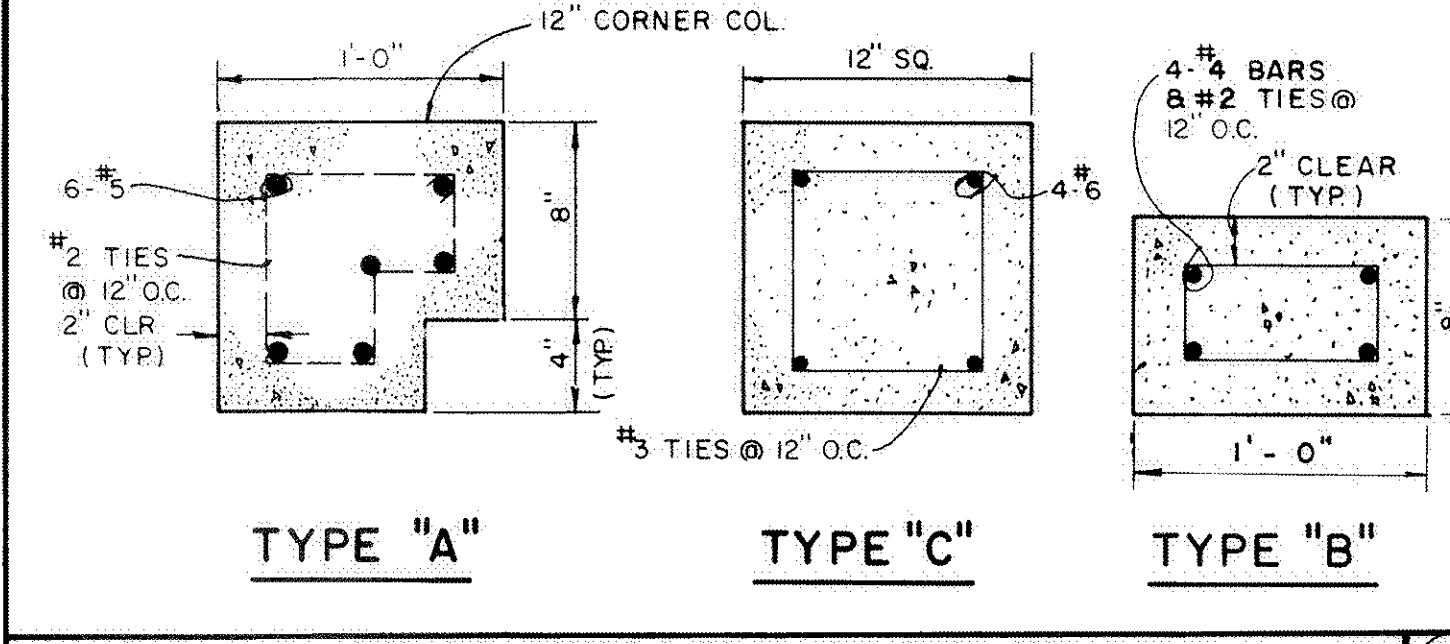
WEST ELEVATION
SCALE: 1/4" / 1'-0"



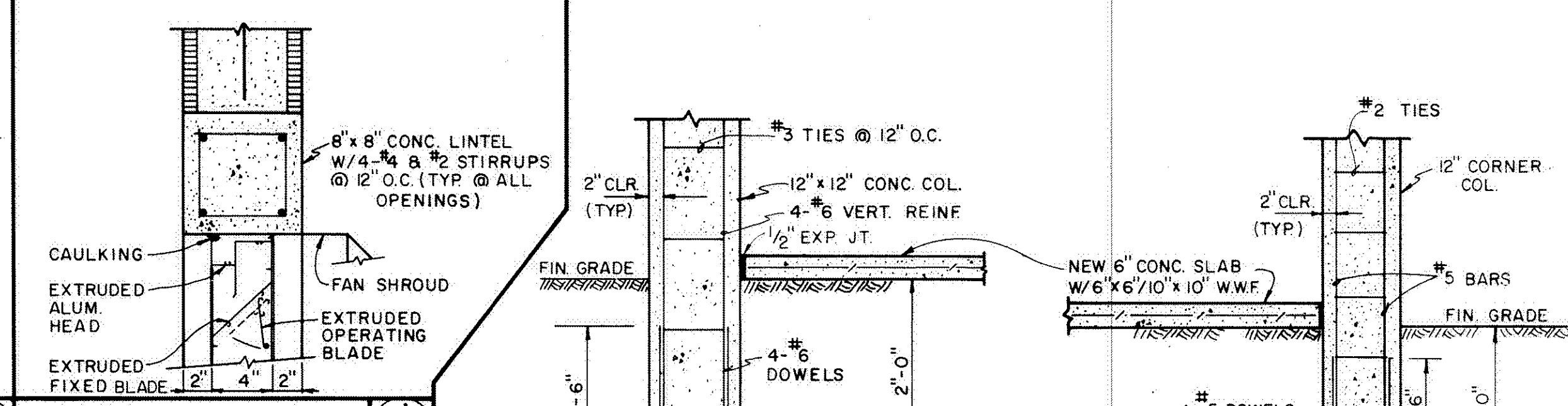
ROOF AND TIE BEAM DETAIL SCALE: 1/2" / 1'-0"
WALL FOOTING DETAIL SCALE: 1/2" / 1'-0"



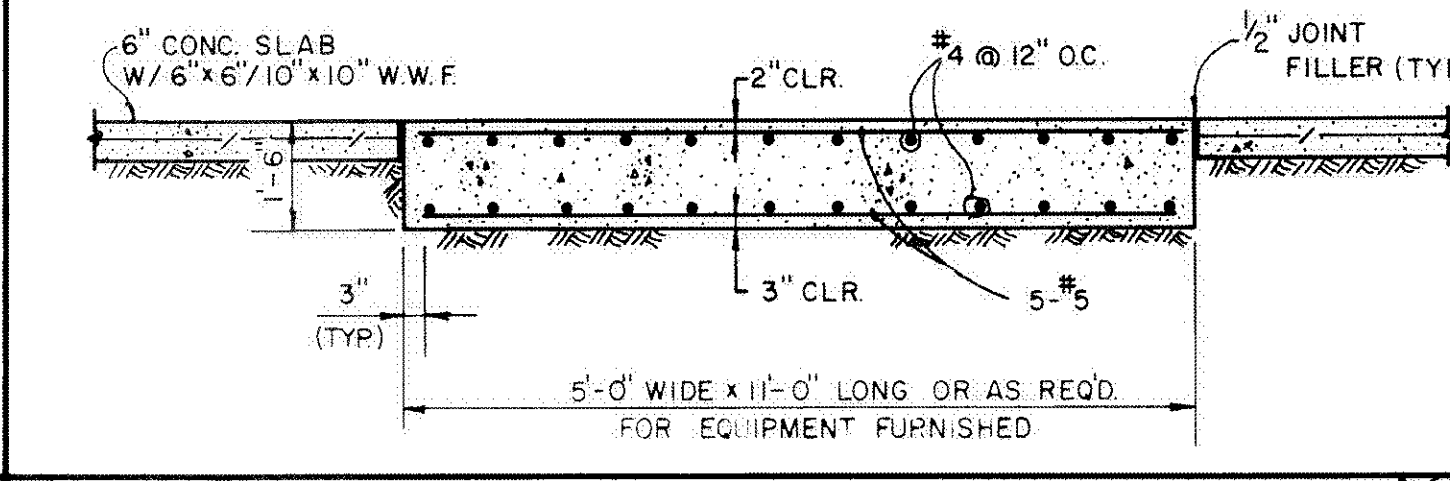
SECTION
SCALE: 1/4" / 1'-0"



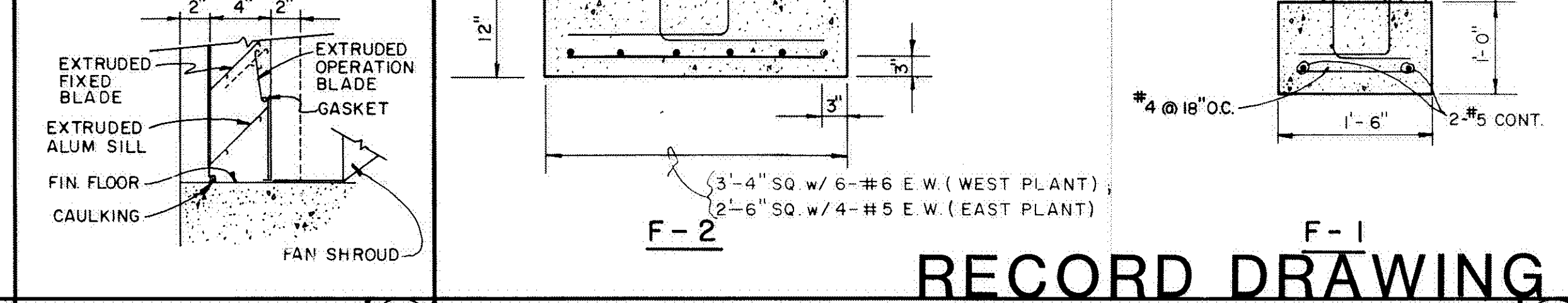
COLUMN DETAILS
SCALE: 1-1/2" / 1'-0"



HEAD SCALE: 1/2" / 1'-0"
FOOTING DETAILS SCALE: 3/4" / 1'-0"



GENERATOR FOUNDATION DETAIL
SCALE: 3/8" / 1'-0"



SILL SCALE: 1/2" / 1'-0"
FOOTING DETAILS SCALE: 3/4" / 1'-0"

REV	DATE	BY	DESCRIPTION
2	5/20/84	ALS	RECORD DRAWING
1	11/28/84	DPA	MISC. REV.

SCALE:	DESIGNED:	SUBMITTED:
AS SHOWN	K.Y.	Ben H. Chen
	D.H.K.	PROJECT ENGINEER
	B.H.C.	RECOMMENDED

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.
5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
WEST PLANT PUMP STATION
GENERATOR AND CONTROL BUILDING

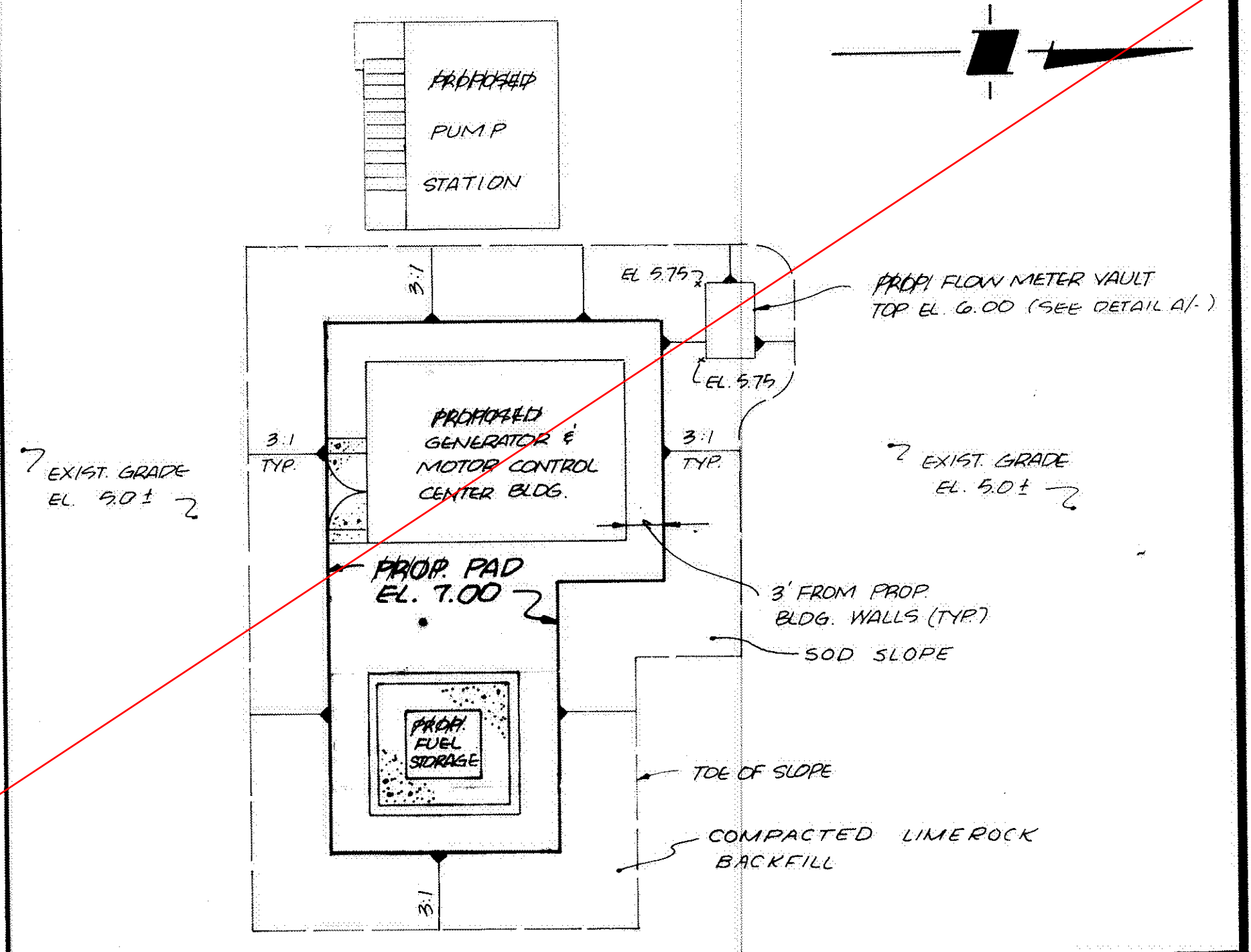
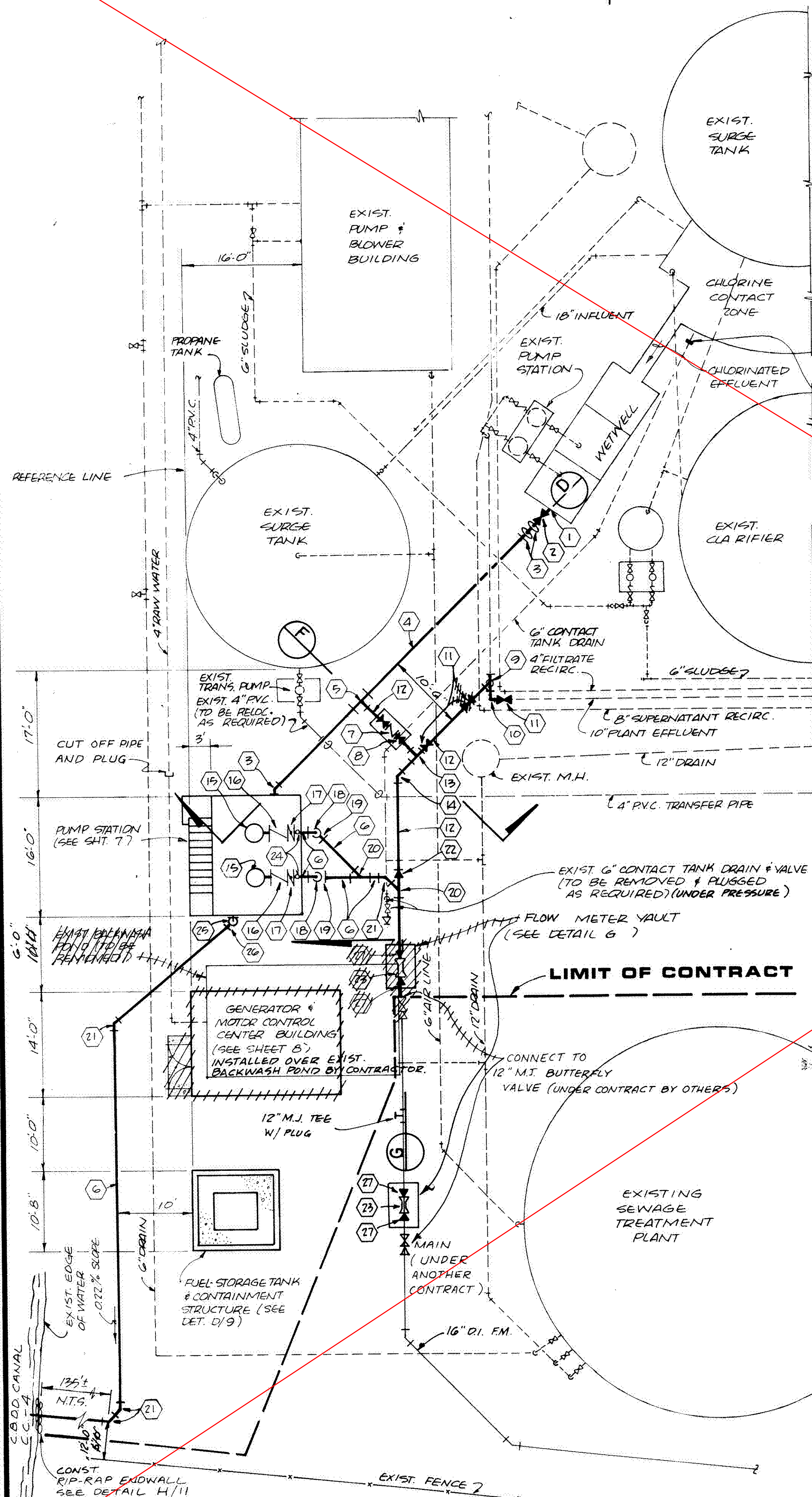
SHEET **5** OF 10 SHEETS

MECHANICAL INDEX

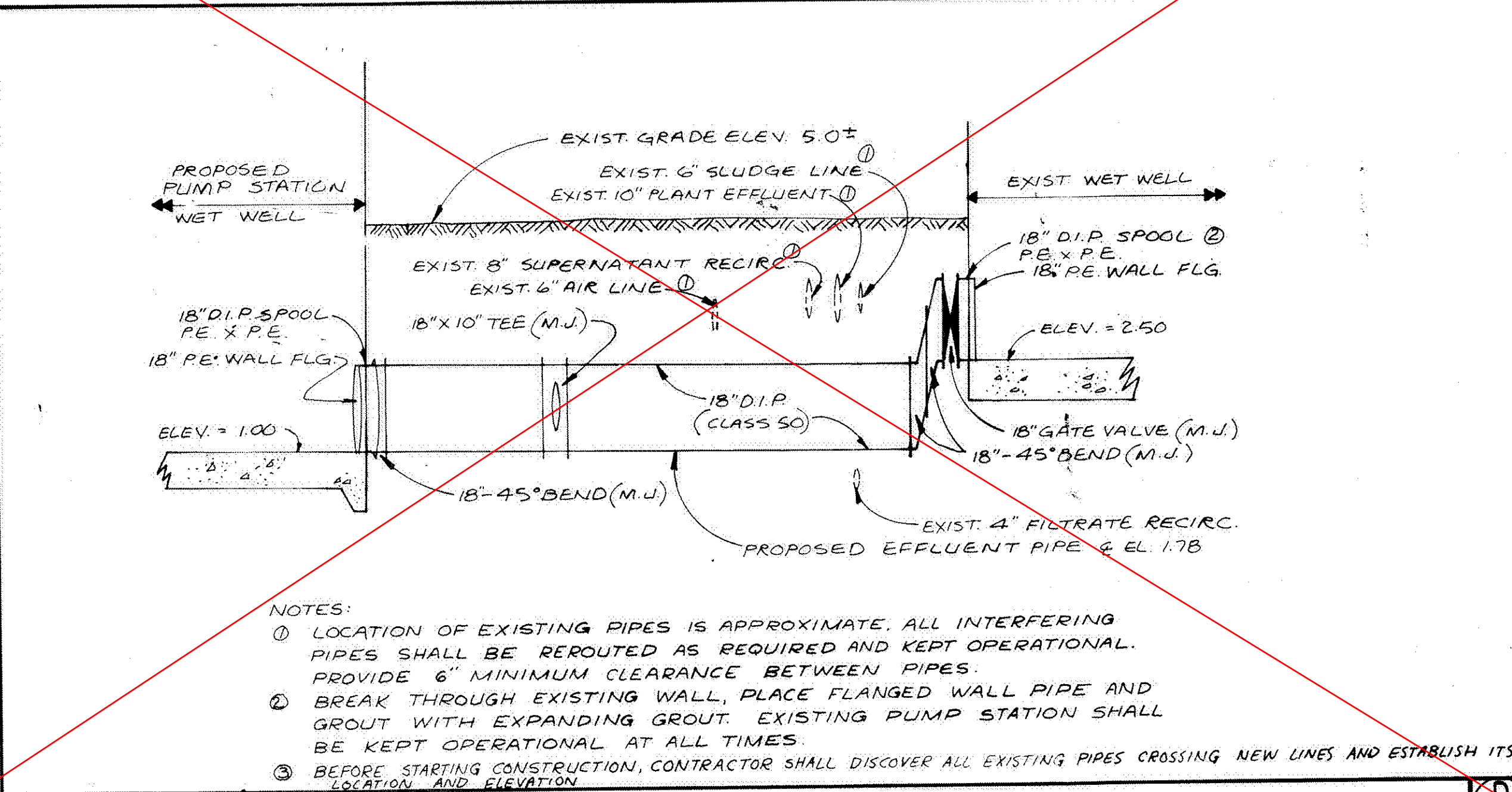
- 1 18" P.E. WALL FLG.
- 2 18" BUTTERFLY VALVE (M.J.)
- 3 18"-45° BEND (M.J.)
- 4 18" D.I. PIPE CLASS 50
- 5 18" x 10" TEE (M.J.)
- 6 12" D.I. PIPE CLASS 50
- 7 10" CHECK VALVE (FLG.)
- 8 10" BUTTERFLY VALVE (FLG.)
- 9 10" x 10" M.J. TEE AND 10" x 90° M.J. BEND-INSTALL IN EXIST. LINE
- 10 10"-90° BEND (M.J.)
- 11 10" BUTTERFLY VALVE (M.J.)
- 12 10" D.I. PIPE
- 13 10" TEE (M.J.)
- 14 10" x 45° BEND (M.J.)
- 15 VERT. PUMP (P-7, P-8)
- 16 12" PUMP CONTROL VALVE (FLG.)
- 17 12" BUTTERFLY VALVE (FLG.) W/ELECTRIC OPERATOR
- 18 12"-90° L.R. BEND (FLG.)
- 19 12"-90° L.R. BEND (M.J.)
- 20 12" WYE-BRANCH (M.J.)
- 21 12"-45° BEND (M.J.)
- 22 12" x 10" RED. (M.J.)
- 23 8" FLOW METER M-2 (SEE SPECS)
- 24 1-1/2" AIR RELEASE VALVE AND VACUUM VALVE
- 25 16"-90° S.R. BEND (FLG.)
- 26 16" x 12" x 90° RED. ELL (M.J.)
- 27 12" x 8" REDUCER (FLG.)

NOTE: ALL MECHANICAL JOINT FITTINGS SHALL BE PROVIDED WITH RETAINER GLANDS.

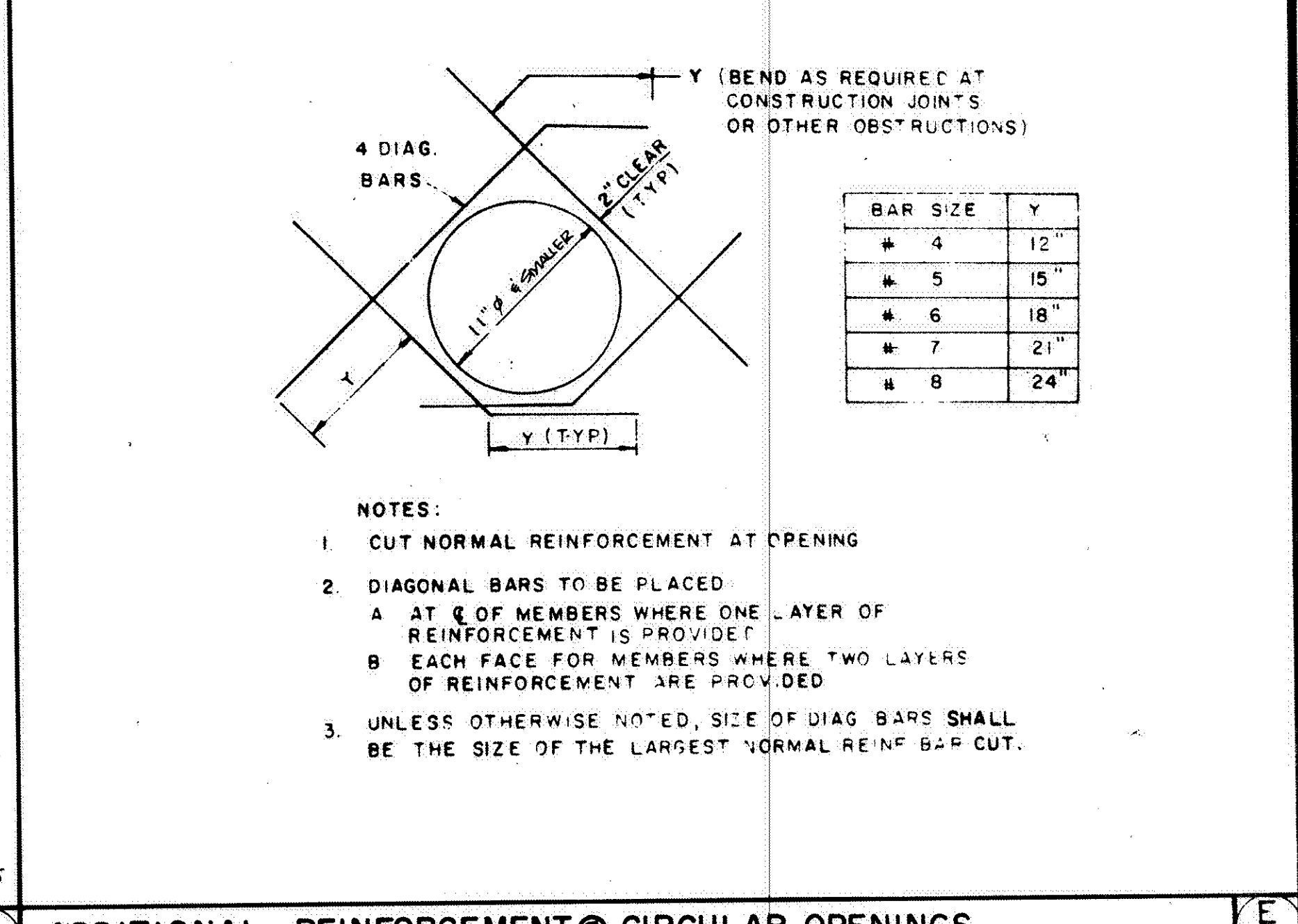
Issued For Informational Purposes



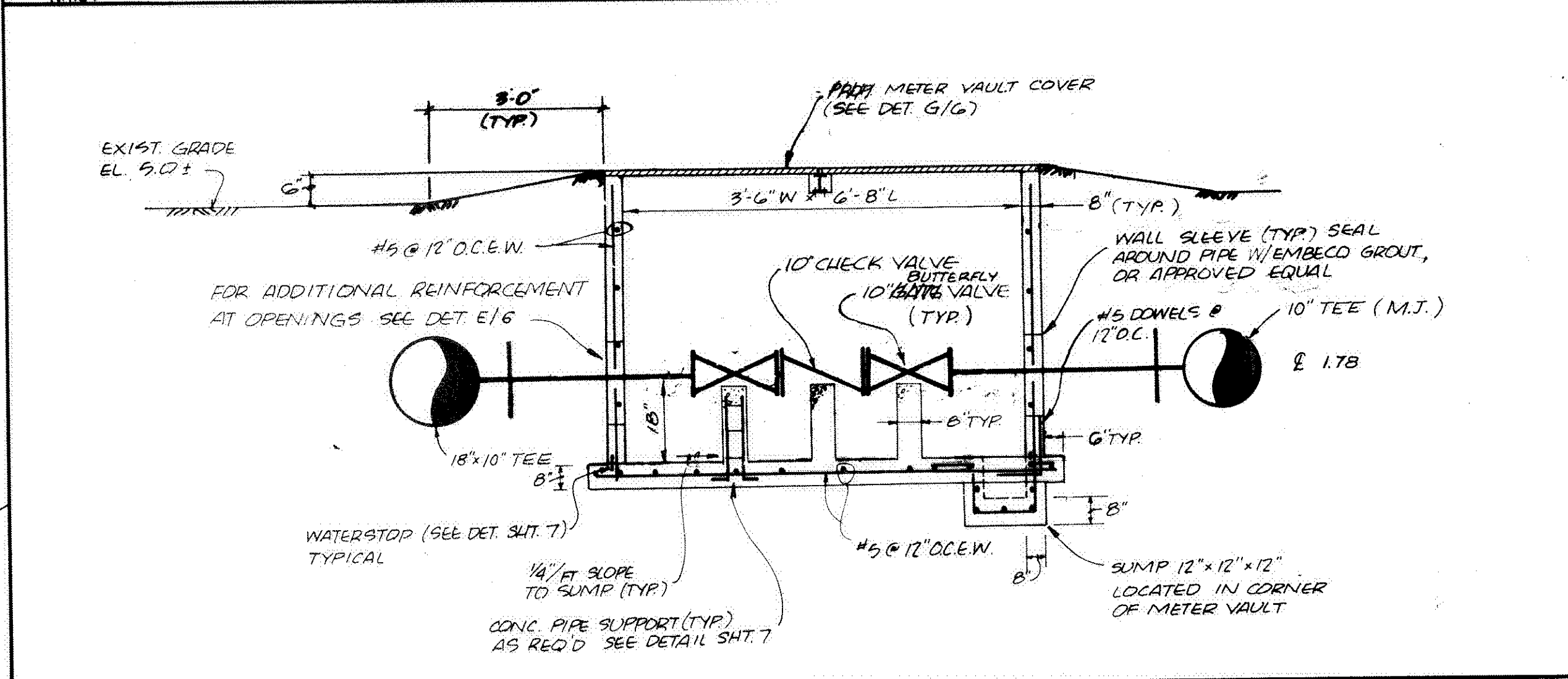
BUILDING PAD PLAN
SCALE: 1" = 10'



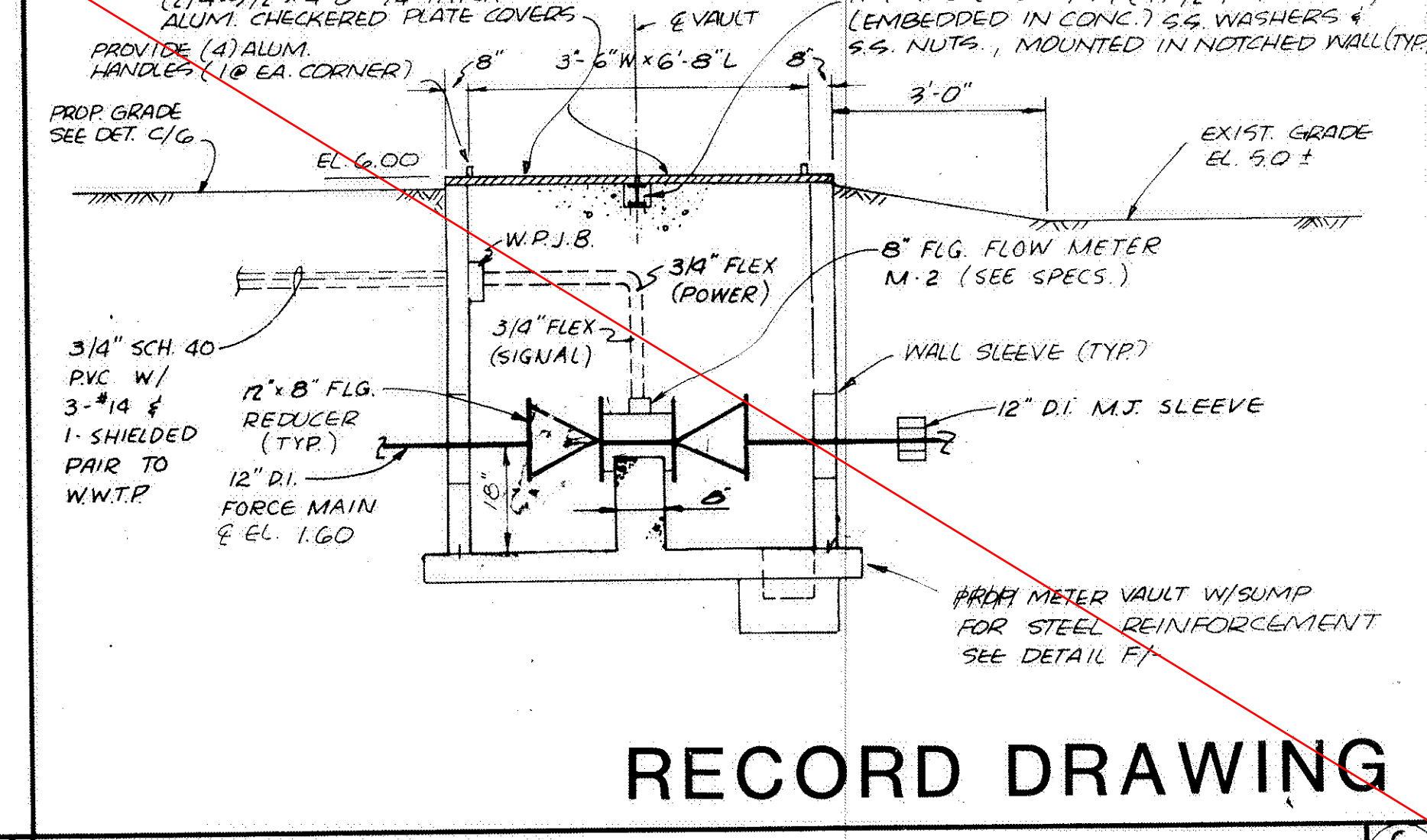
SUCTION PIPE PROFILE / SECTION
NTS.



ADDITIONAL REINFORCEMENT @ CIRCULAR OPENINGS
NTS.



VALVE VAULT SECTION
NTS.



FLOWMETER VAULT SECTION
NTS.

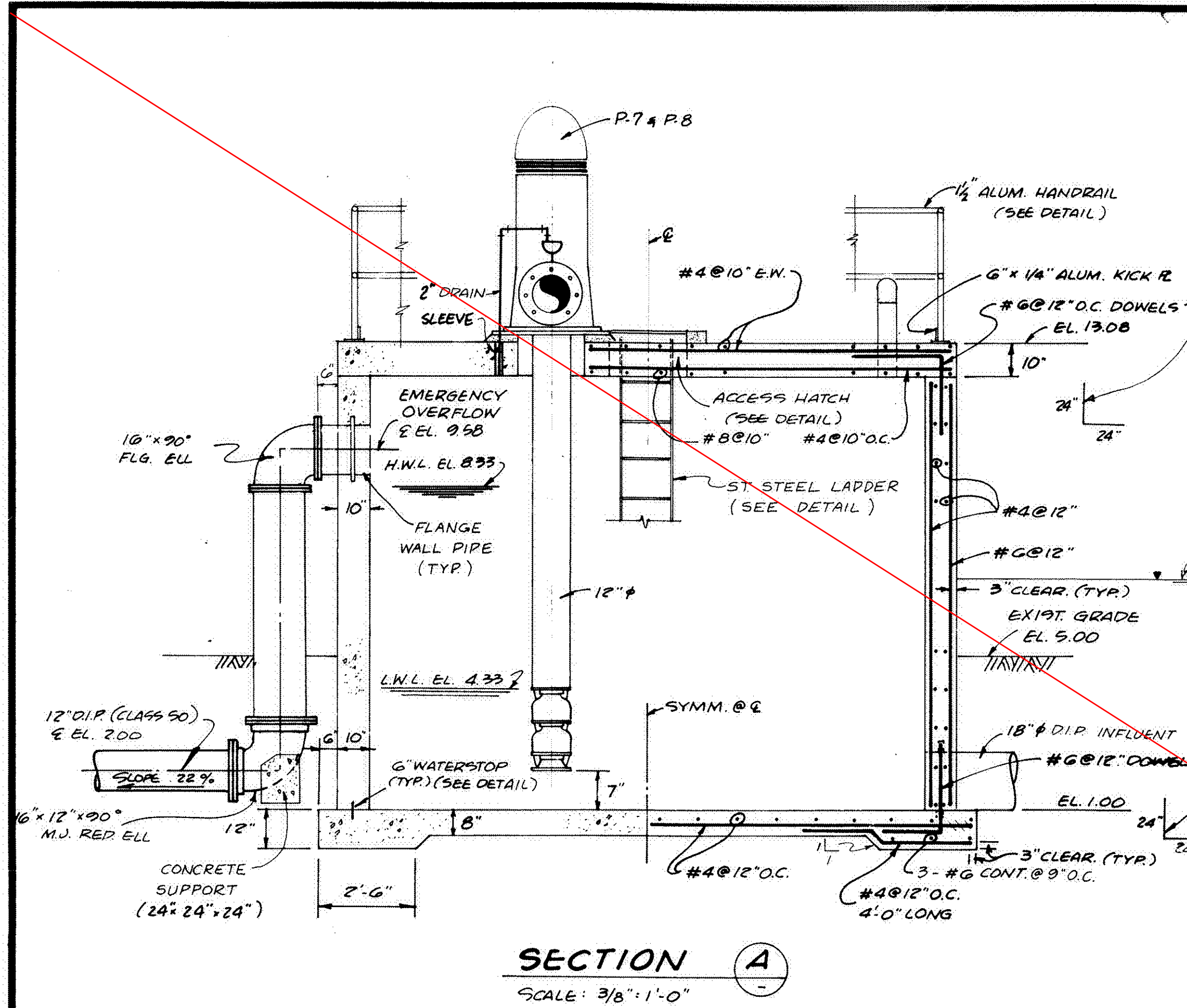
EAST PUMP STATION - SITE PLAN
SCALE: 1" = 10'

REV	DATE	BY	DESCRIPTION
3	5-28-85	DLG	RECORD DRAWING
2	3-28-85	DLG	ADD GEN. M.C.C. BLDG., REV. DET. G.F. & G., DELETE DET. B
1	2-21-85	DLG	REV. METER VAULTS

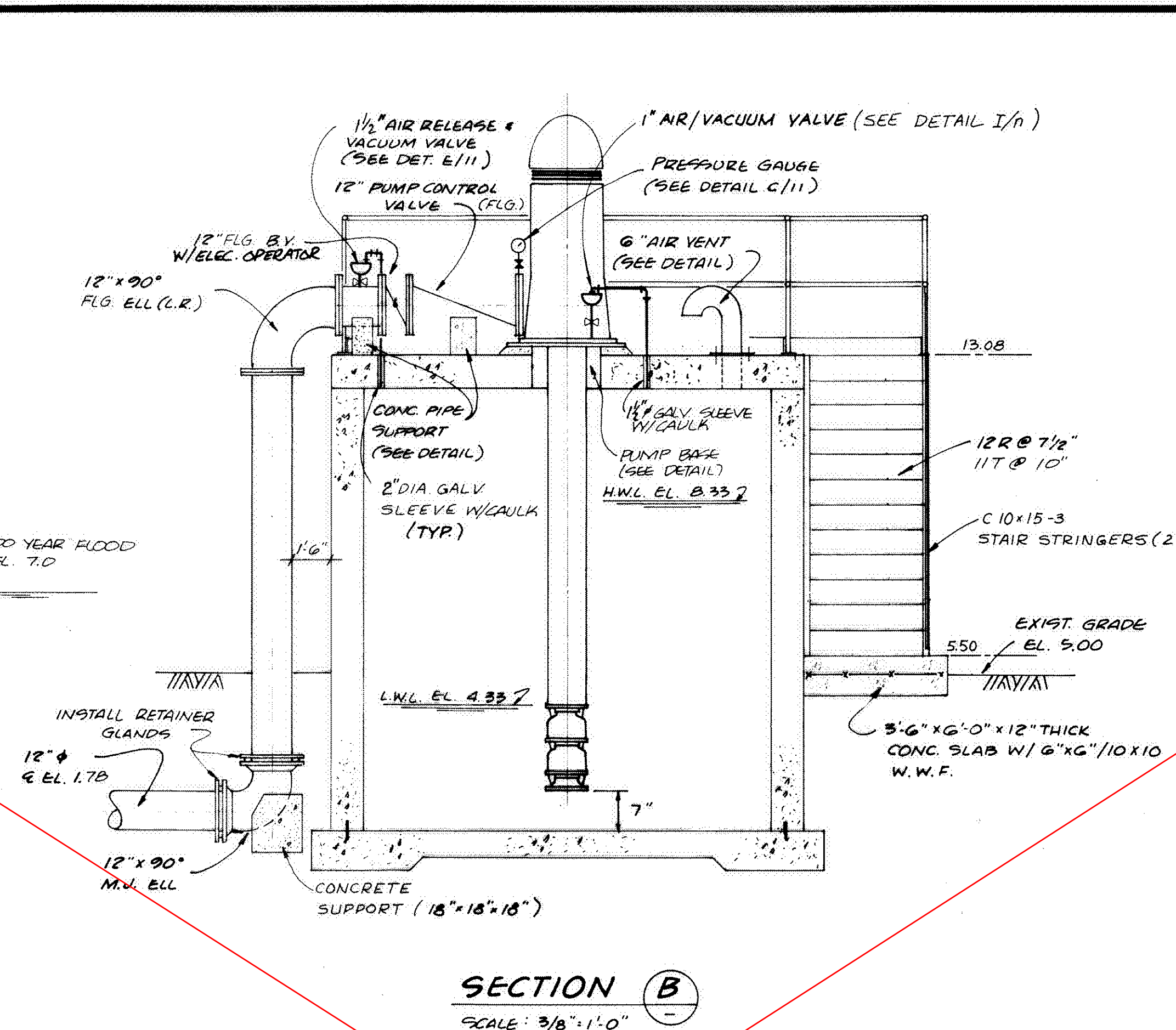
SCALE:	AS NOTED
DESIGNED:	J.A.C.
DRAWN:	D.P.R.
CHECKED:	B.H.C.
SUBMITTED:	Ben J. Clark PROJECT ENGINEER 3/8/85 9-4-85
RECOMMENDED:	Clarence H. Hays 3/4/85 2/4/85

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.
1975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

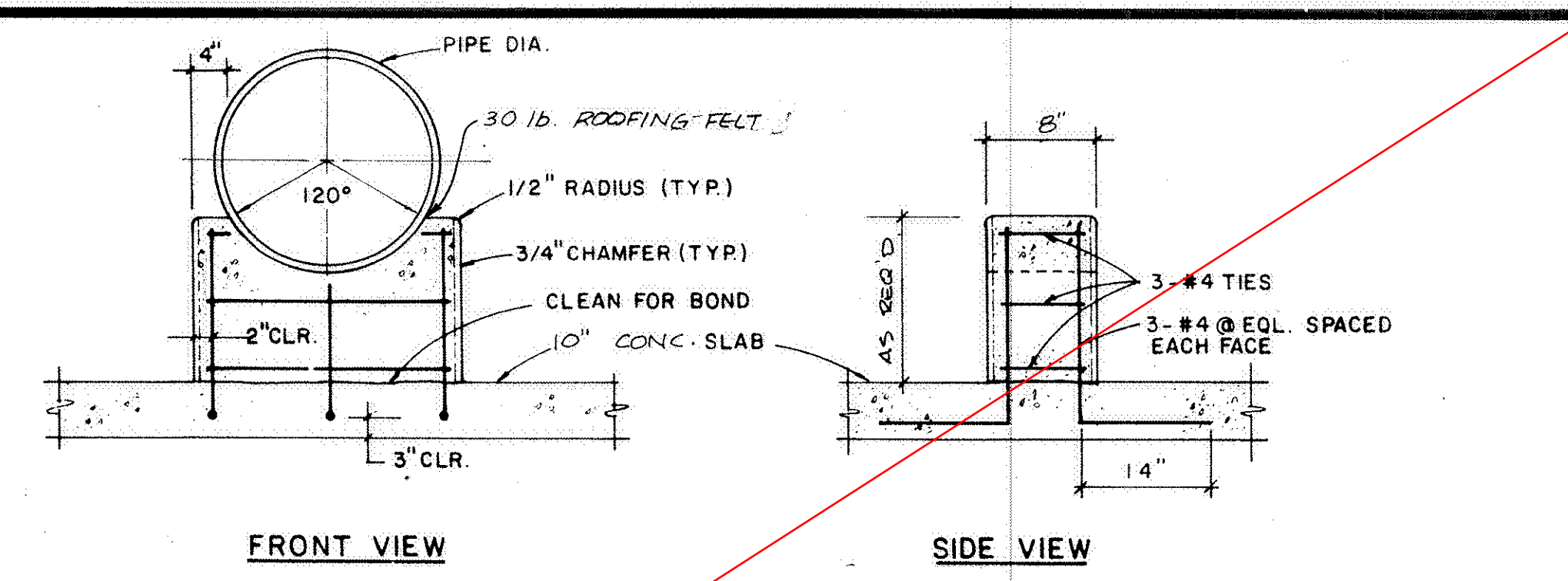
TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
EAST PLANT PUMP STATION
SITE PLAN AND DETAILS



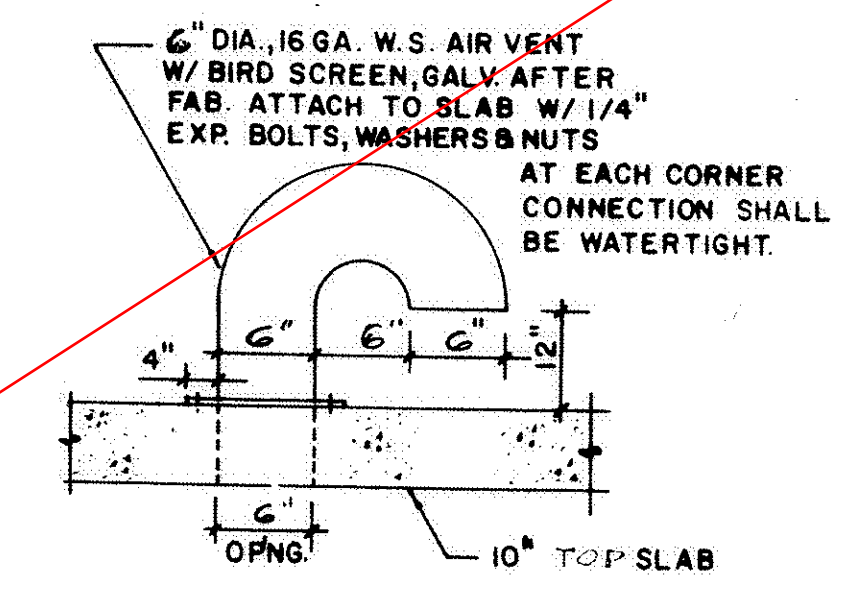
SECTION A
SCALE: 3/8" = 1'-0"



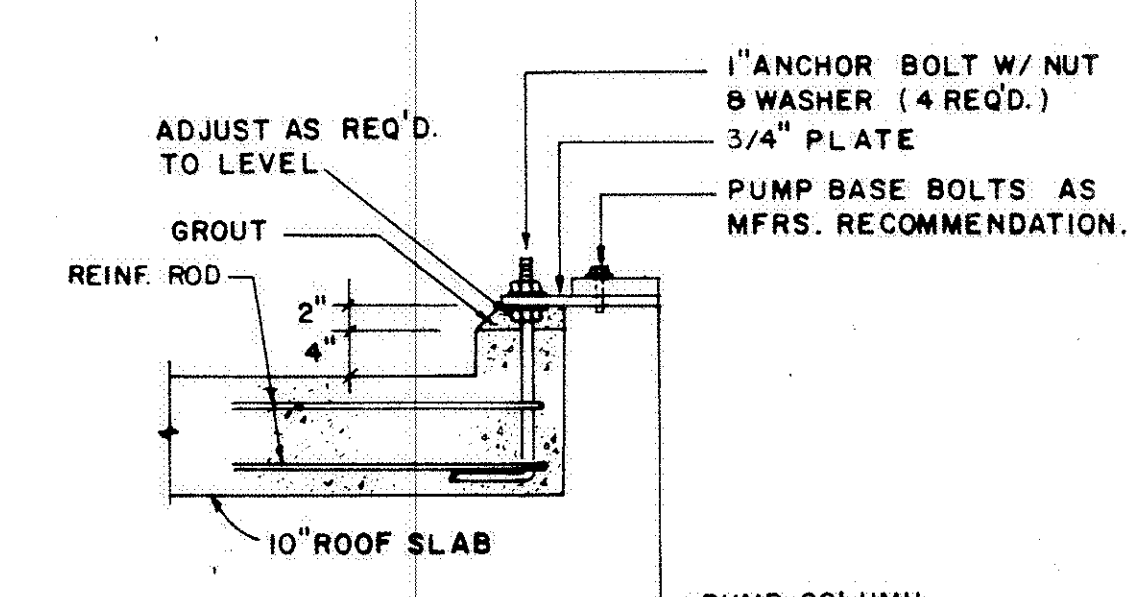
SECTION B
SCALE: 3/8" = 1'-0"



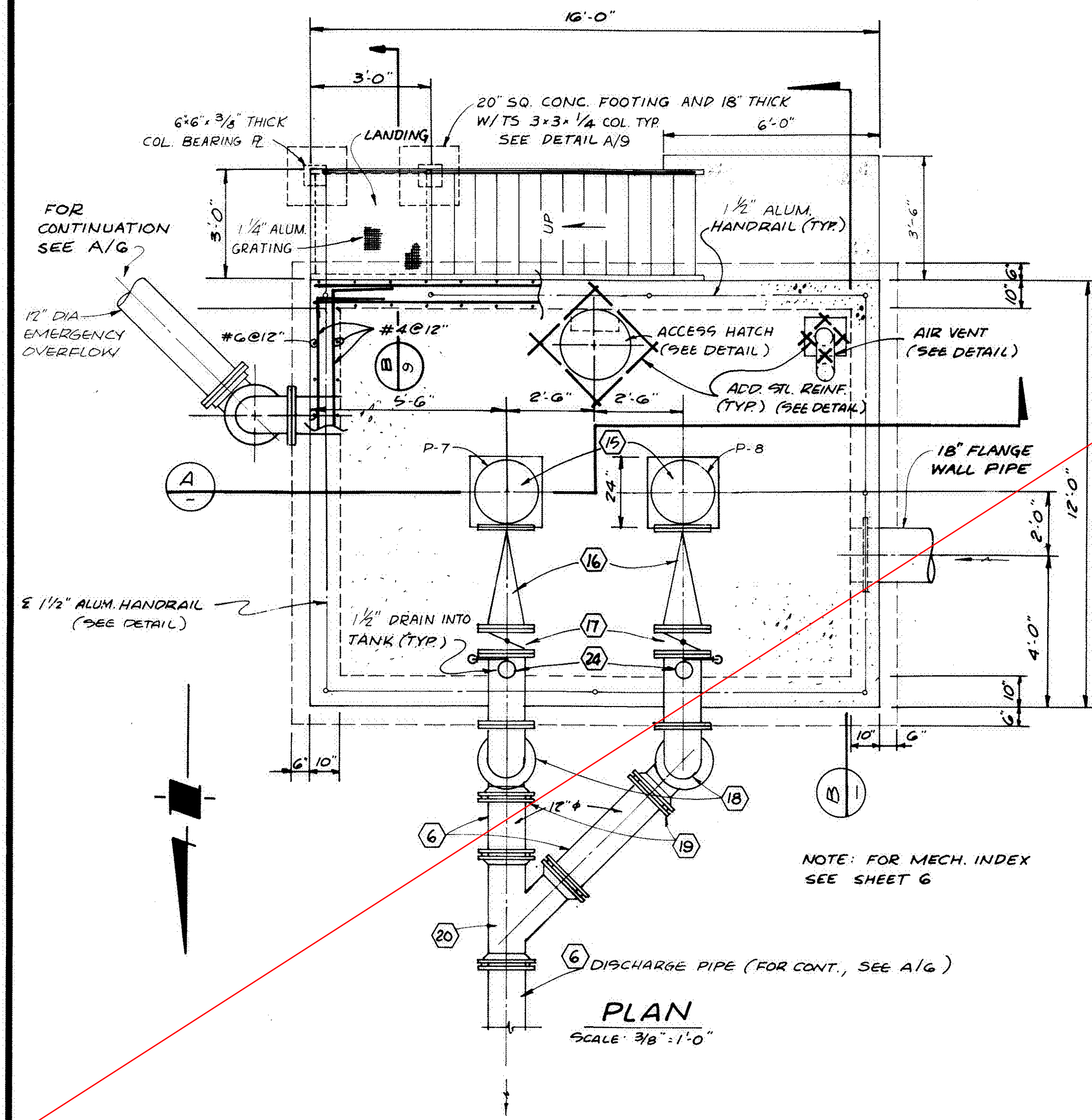
CONC. PIPE SUPPORT DETAILS
N.T.S.



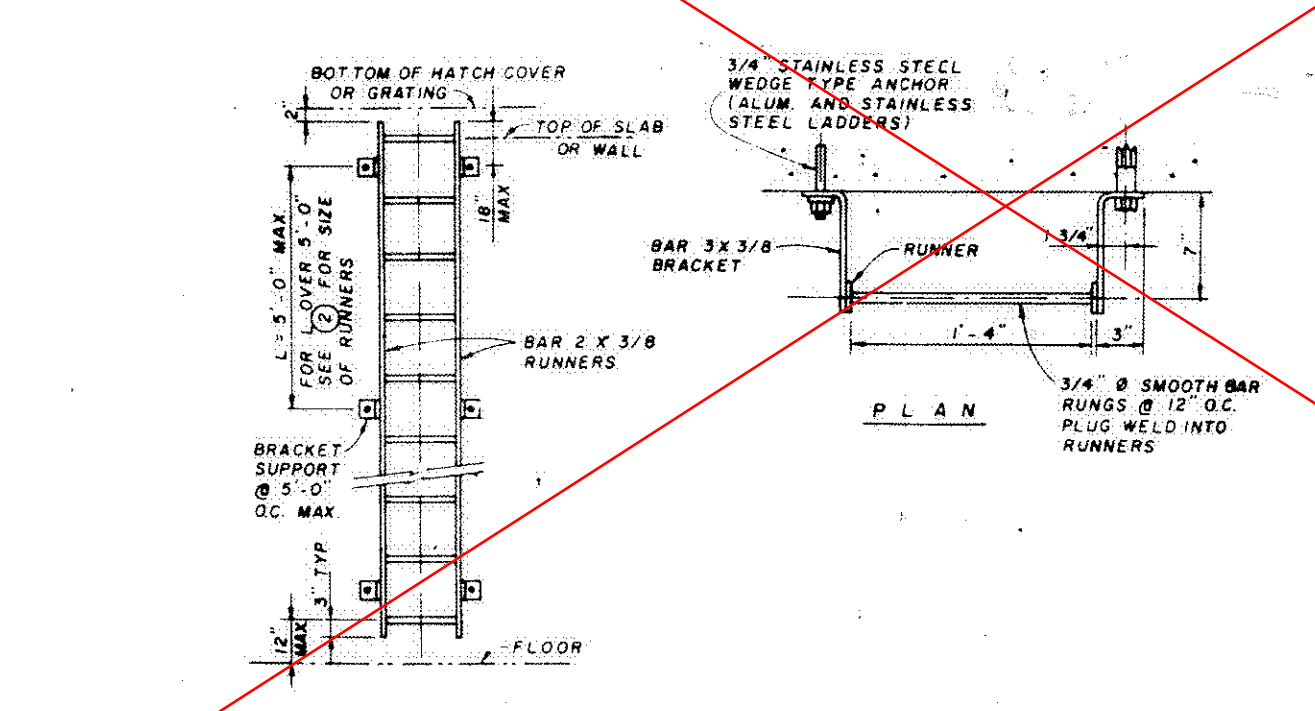
AIR VENT DETAIL
SCALE: N.T.S.



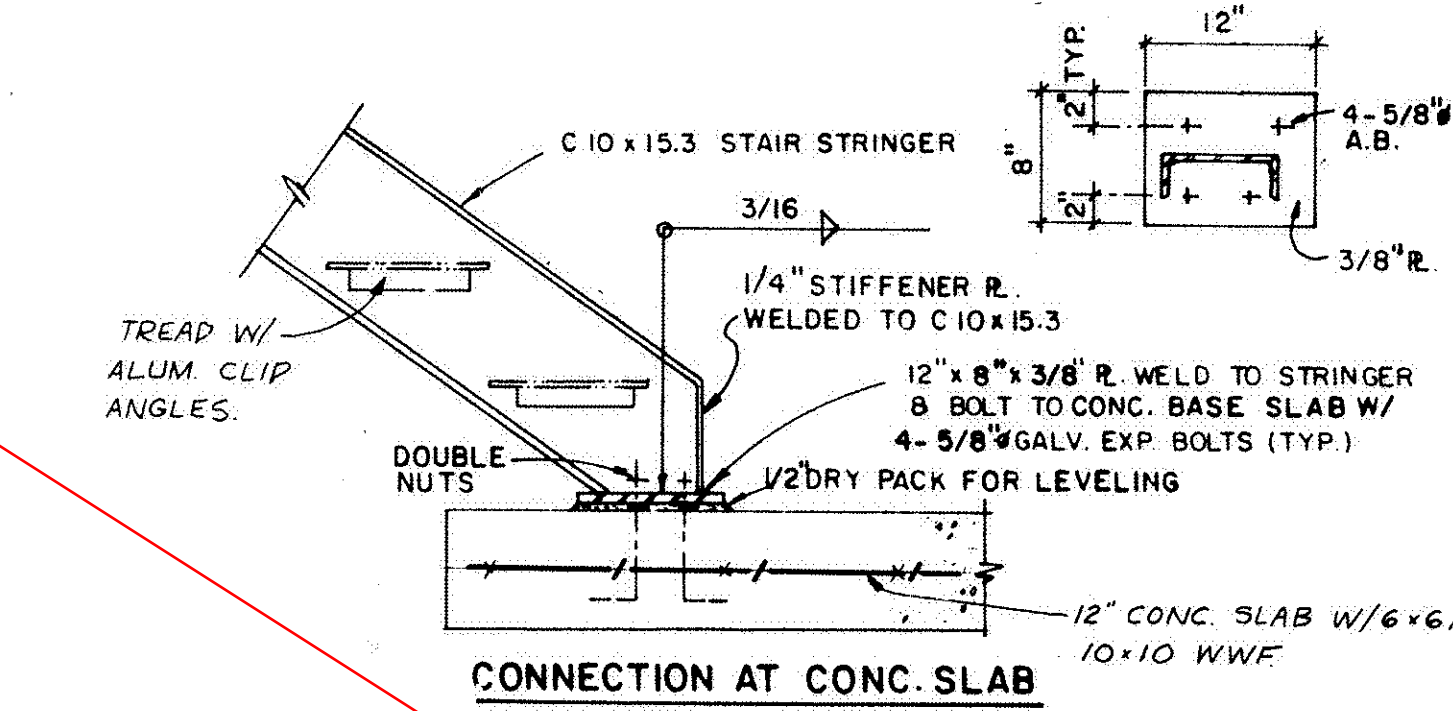
PUMP BASE DETAIL
SCALE: 3/4" = 1'-0"



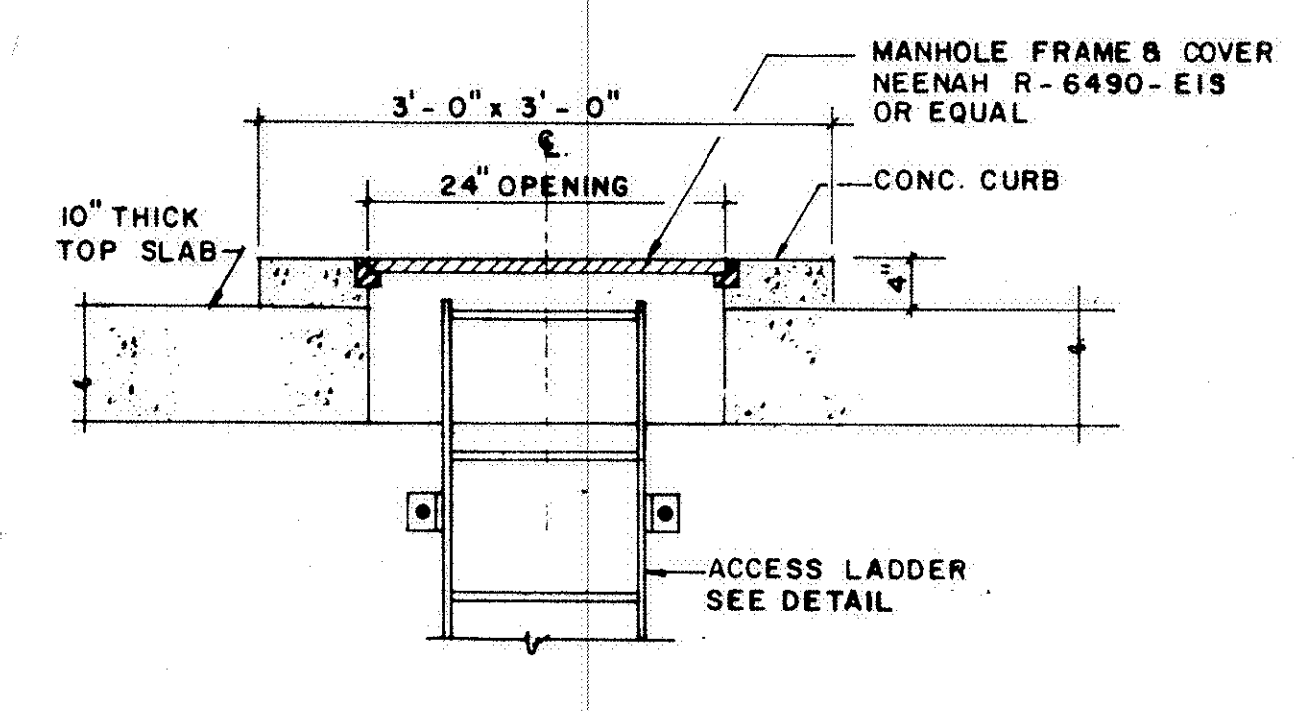
PLAN
SCALE: 3/8" = 1'-0"



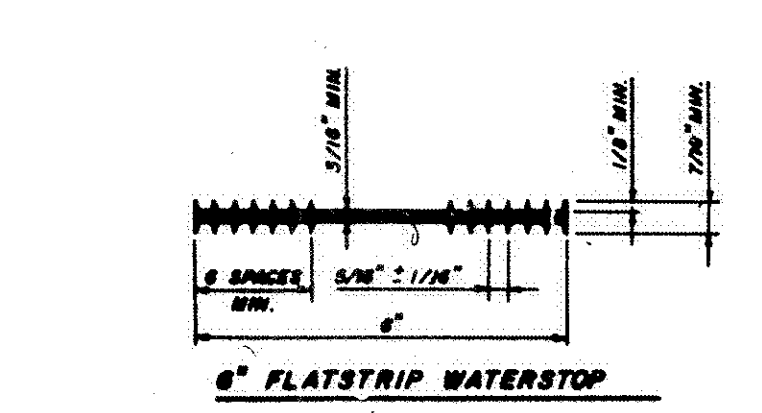
LADDER DETAILS
N.T.S.



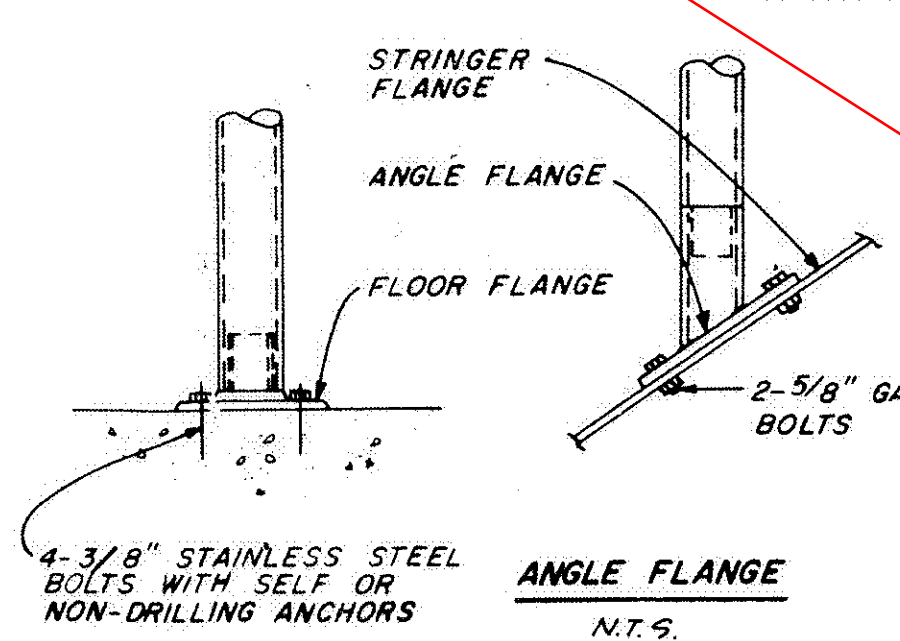
CONNECTION AT CONC. SLAB
N.T.S.



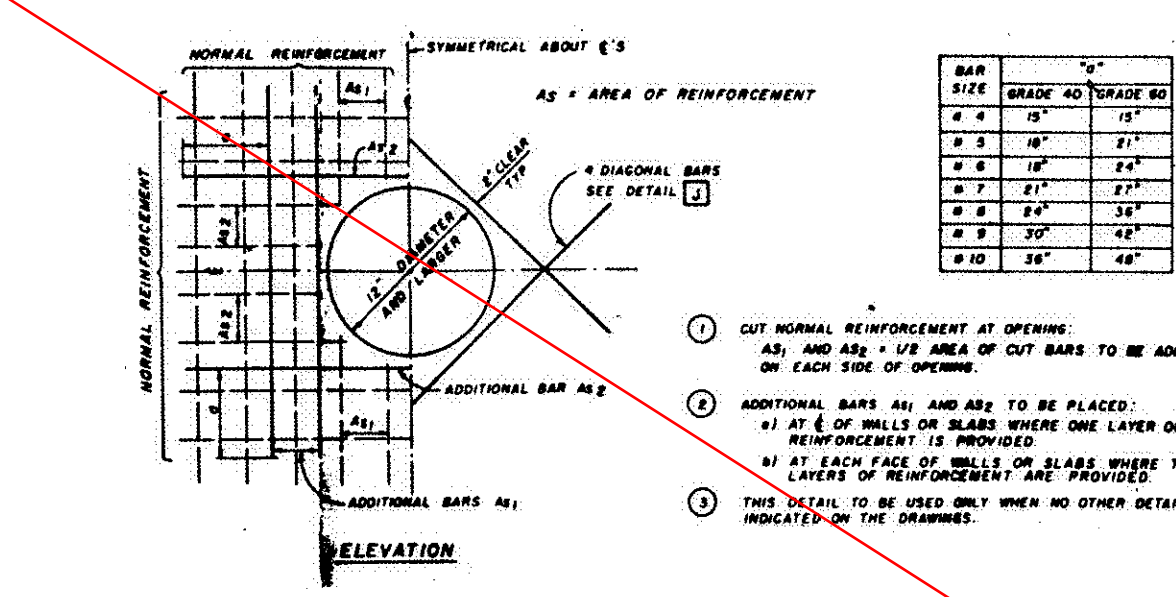
ACCESS HATCH DETAIL
SCALE: 3/4" = 1'-0"



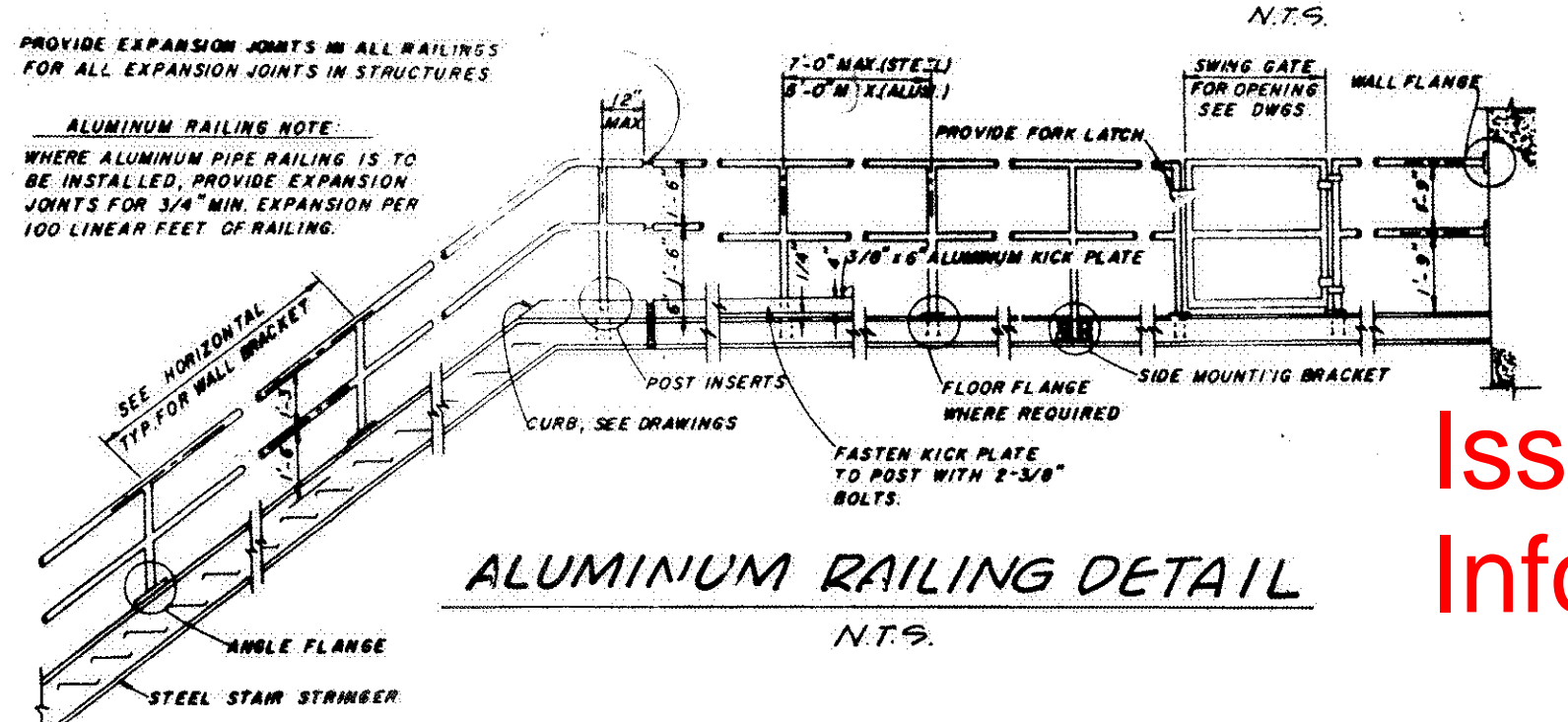
WATERSTOP DETAIL
N.T.S.



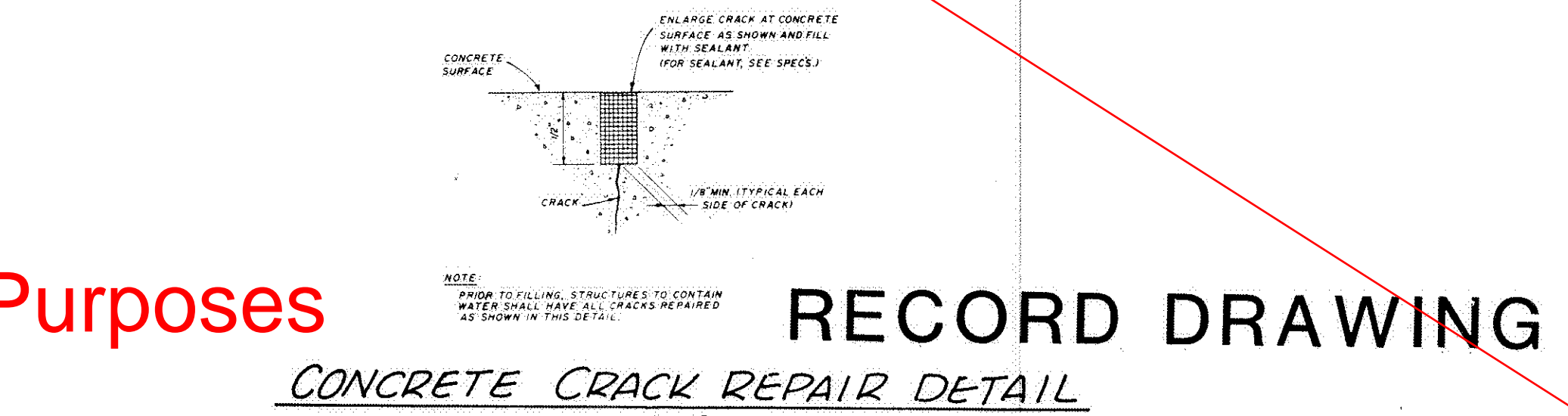
ANGLE FLANGE
N.T.S.



ADDITIONAL REINFORCEMENT AT CIRCULAR OPENINGS
N.T.S.



ALUMINUM RAILING DETAIL
N.T.S.



CONCRETE CRACK REPAIR DETAIL
N.T.S.

Issued For Informational Purposes

RECORD DRAWING

REV	DATE	BY	DESCRIPTION
2	6/28/14	ALS	RECORD DRAWING
1	5/28/14	DHK	GENERAL REVISION

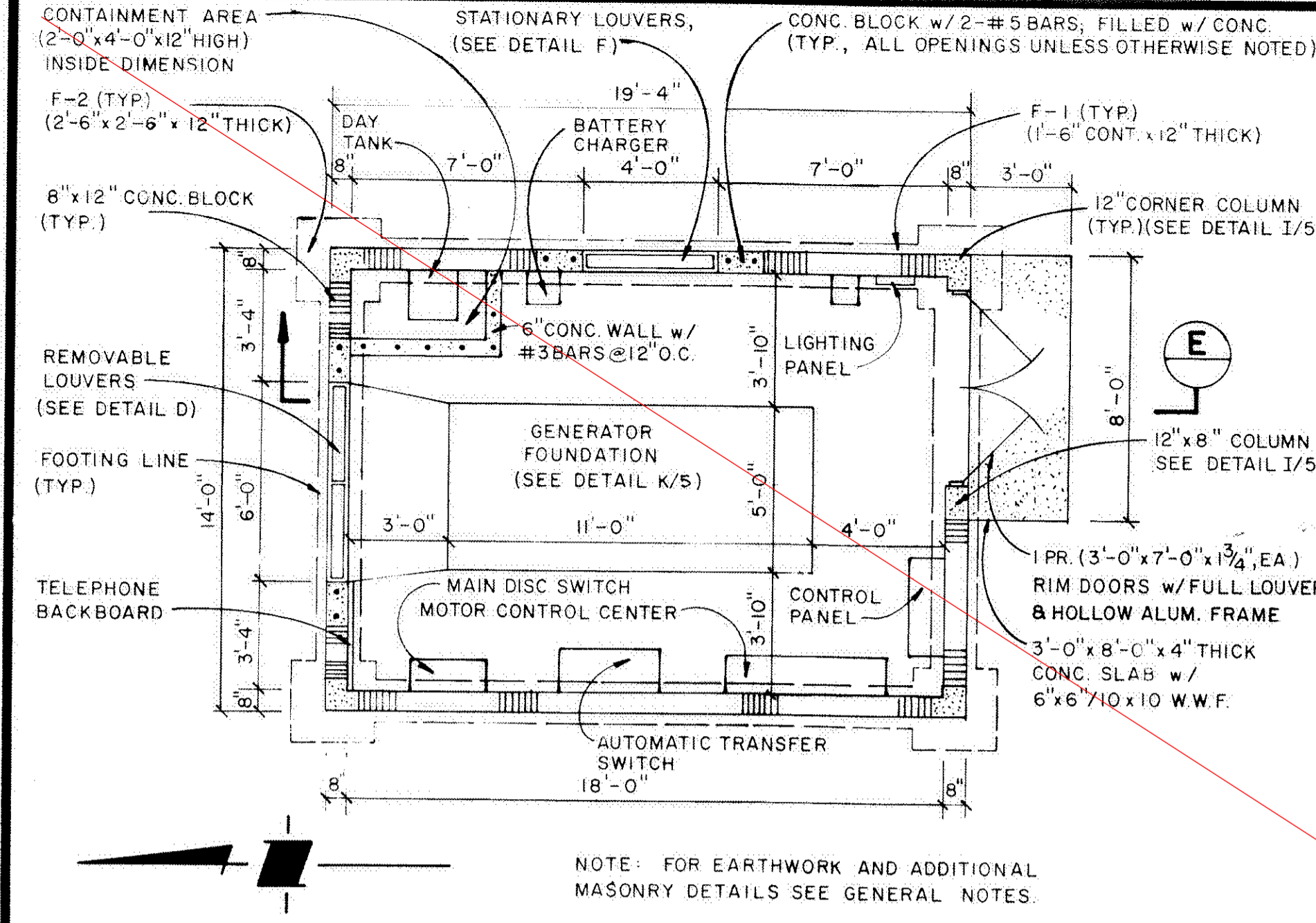
SCALE:	AS NOTED
DESIGNED:	K.Y./J.A.C.
DRAWN:	K.Y./J.A.S.
CHECKED:	B.H.C.

SUBMITTED:	3/18/14	9-4-14
PROJECT ENGINEER:	Brent H. Chen	R.C.E. NO.
RECOMMENDED:	17/141	5/4/15
DATE:		

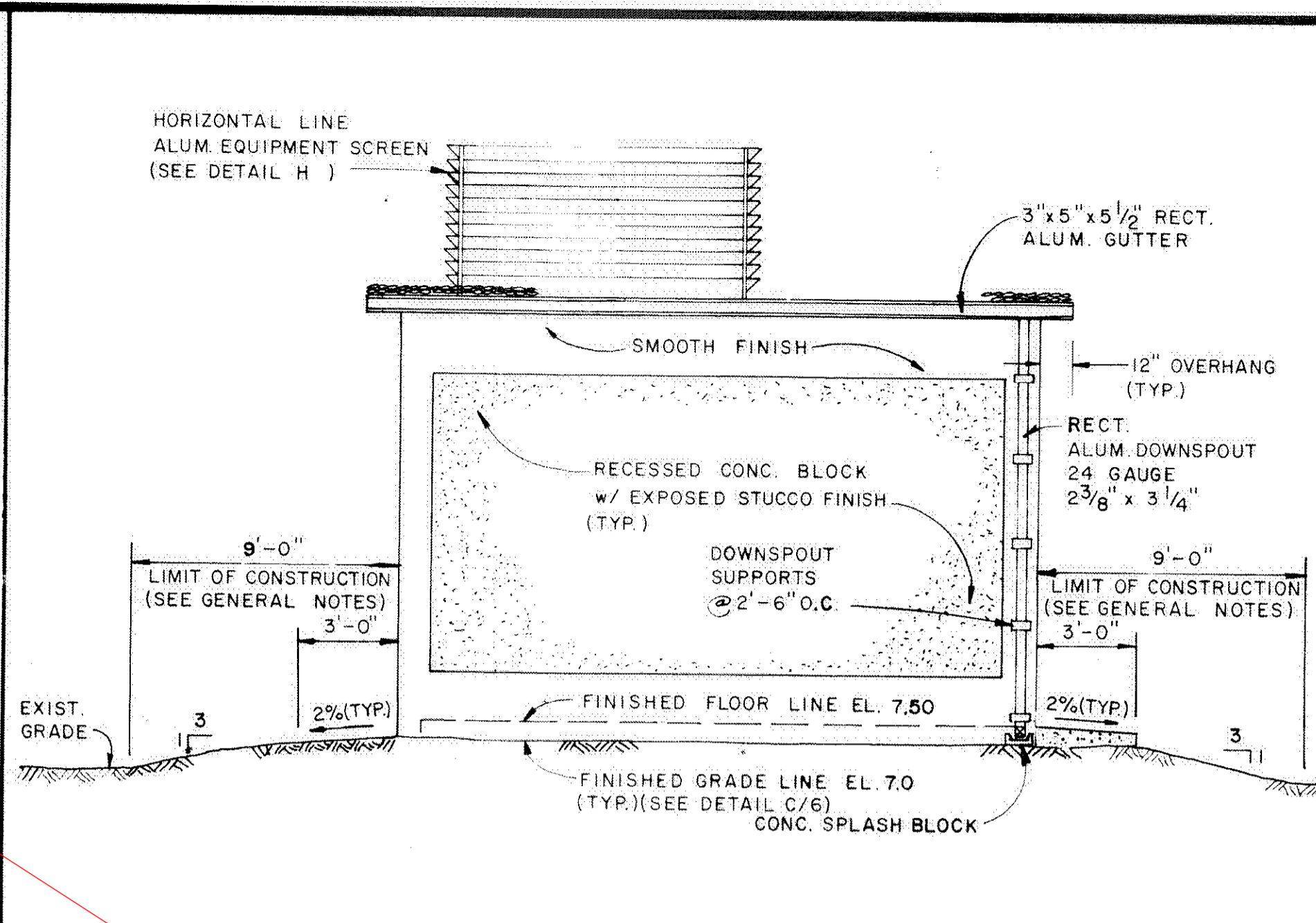
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.
5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
EAST PLANT PUMP STATION

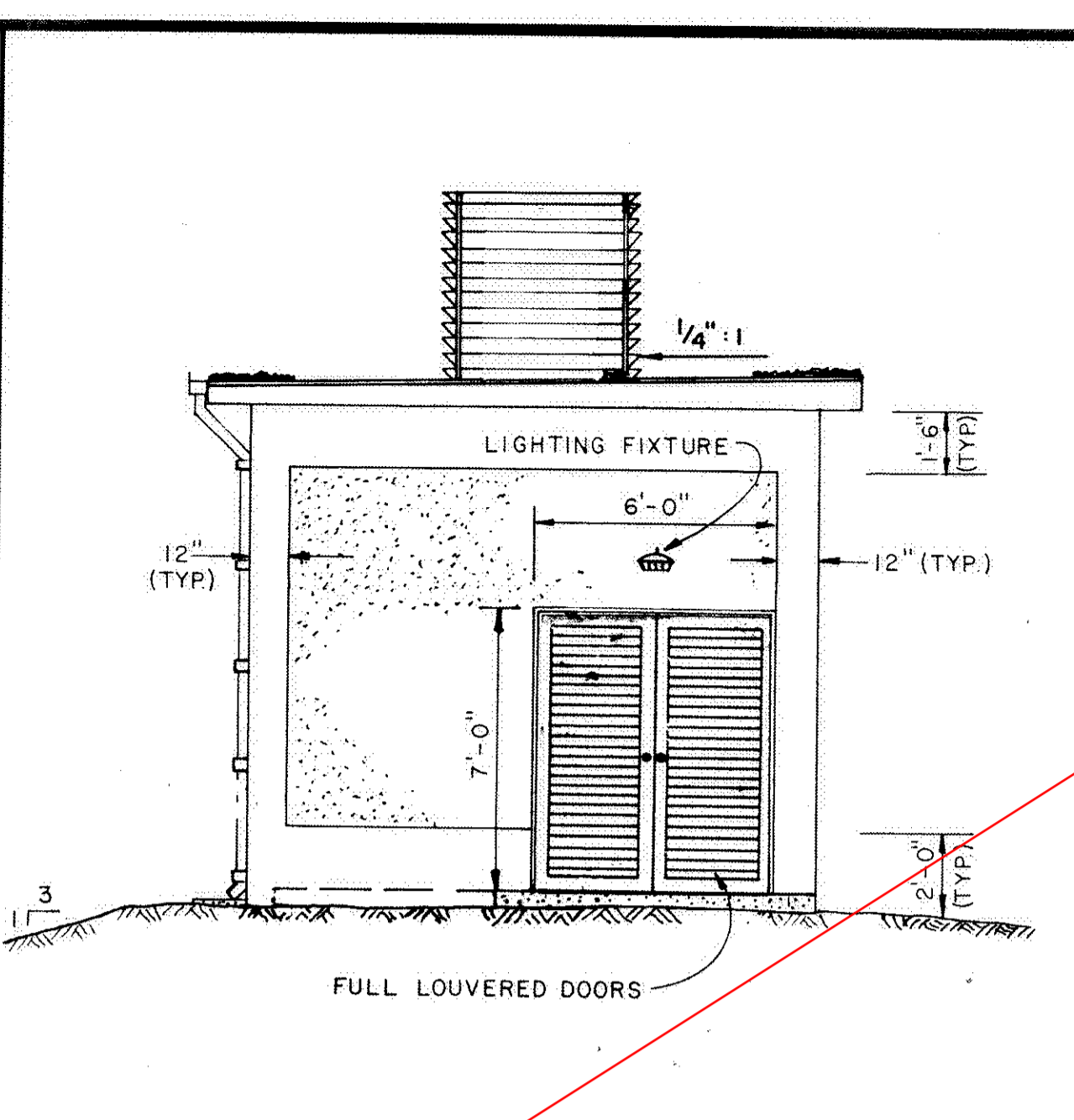
SHEET	7
OF 15 SHEETS	



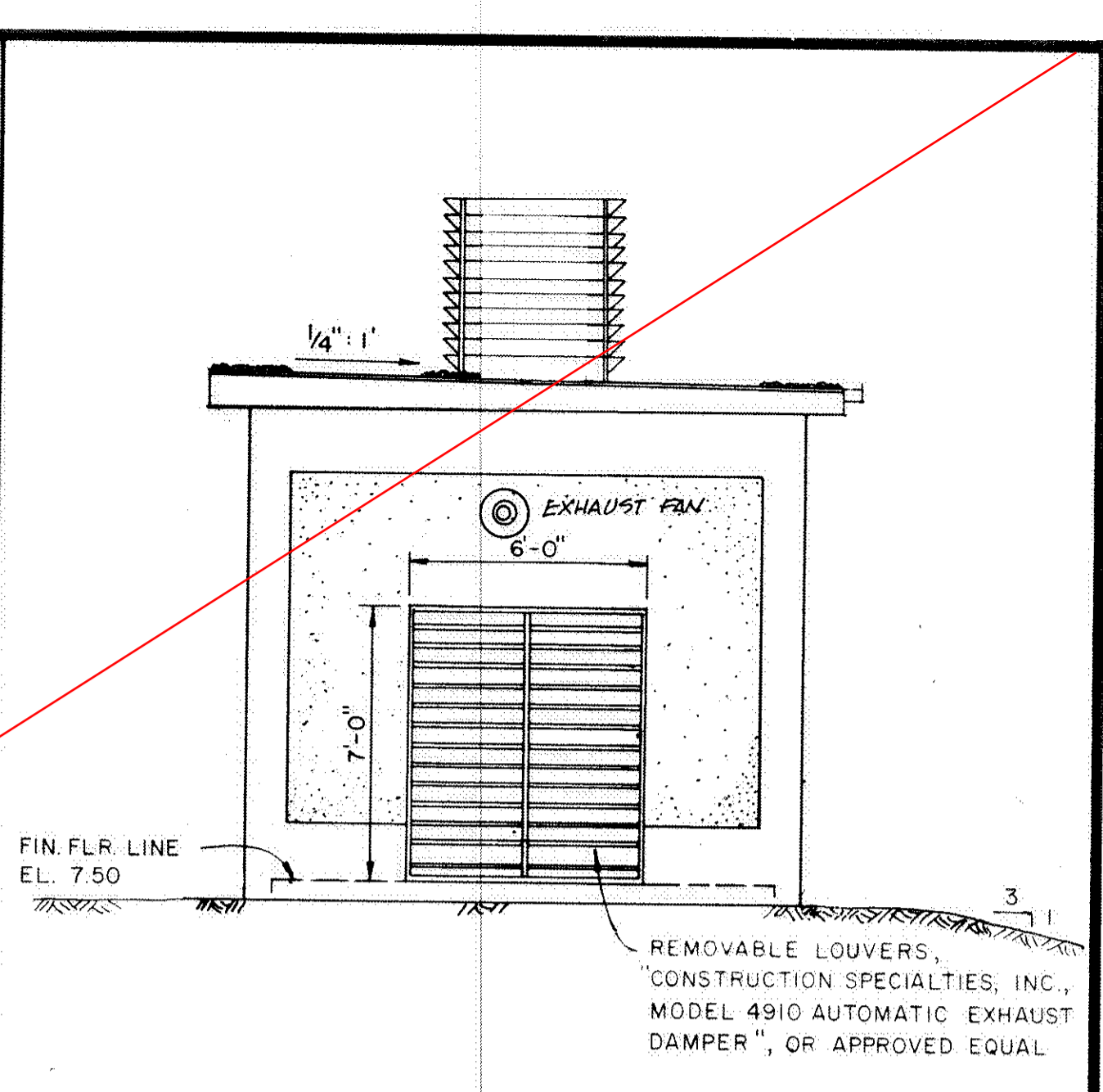
PLAN (SEE REVISED FOUNDATION PLAN BELOW)
SCALE: 1/4" = 1'-0"



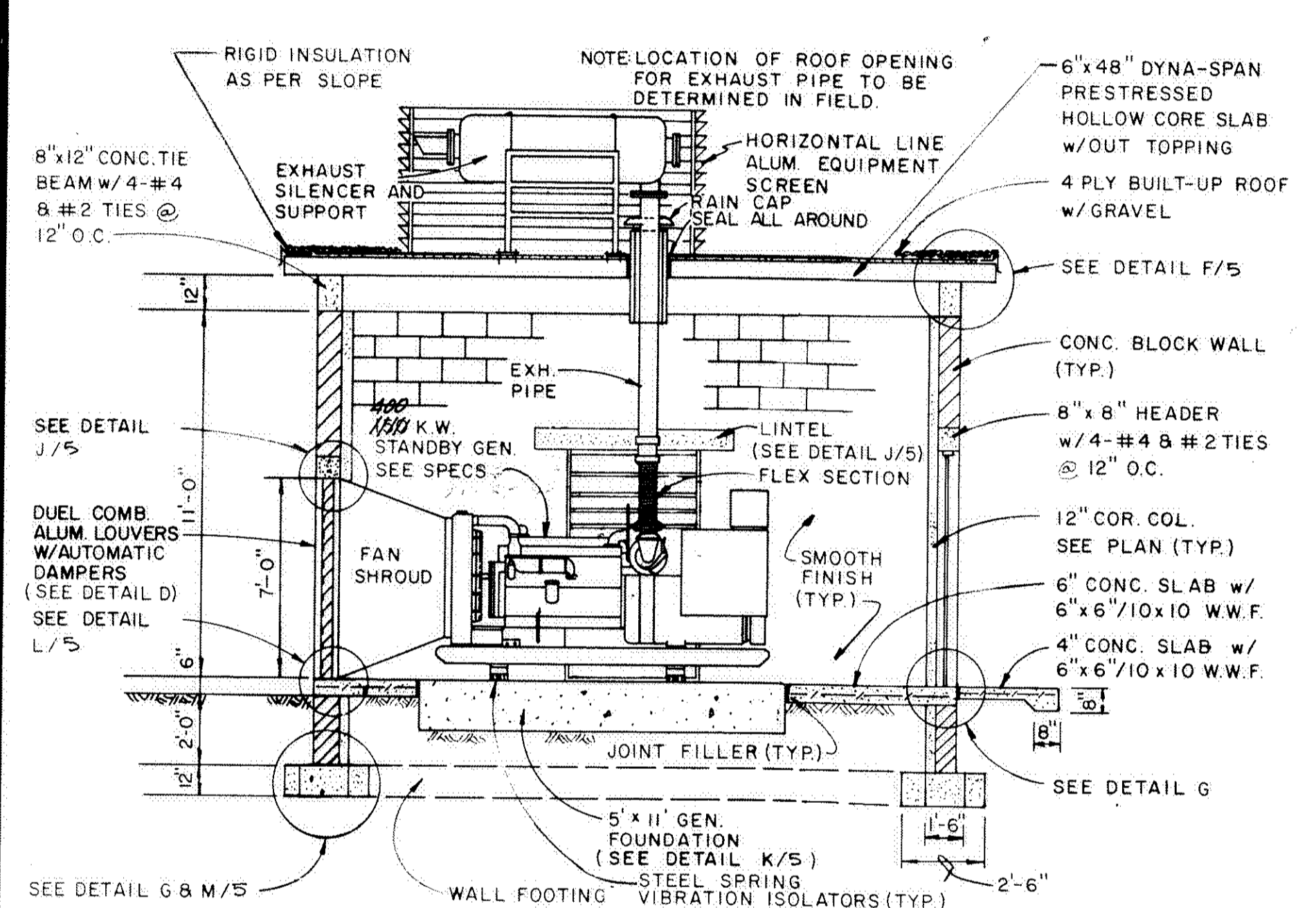
WEST ELEVATION
SCALE: 1/4" = 1'-0"



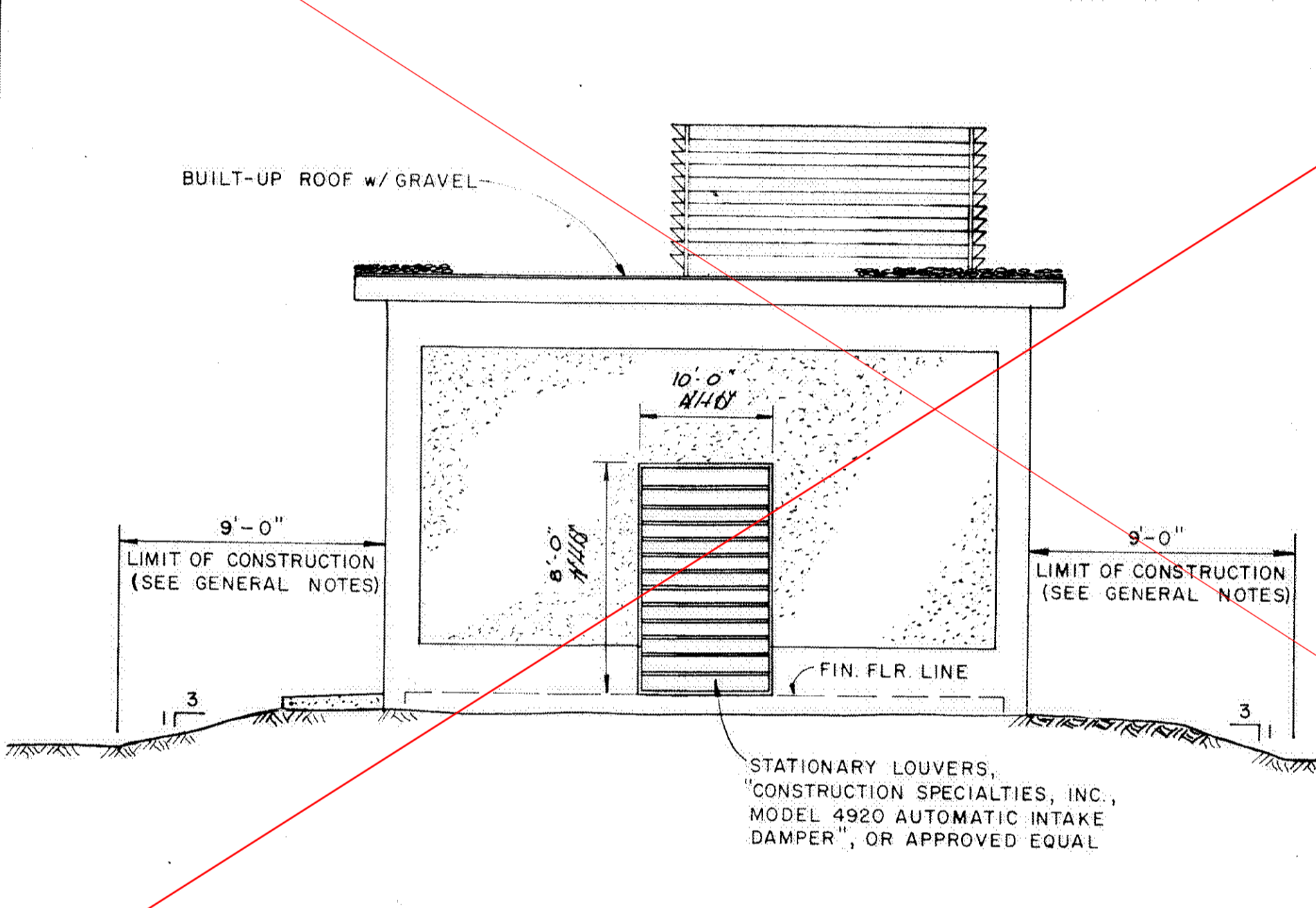
SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



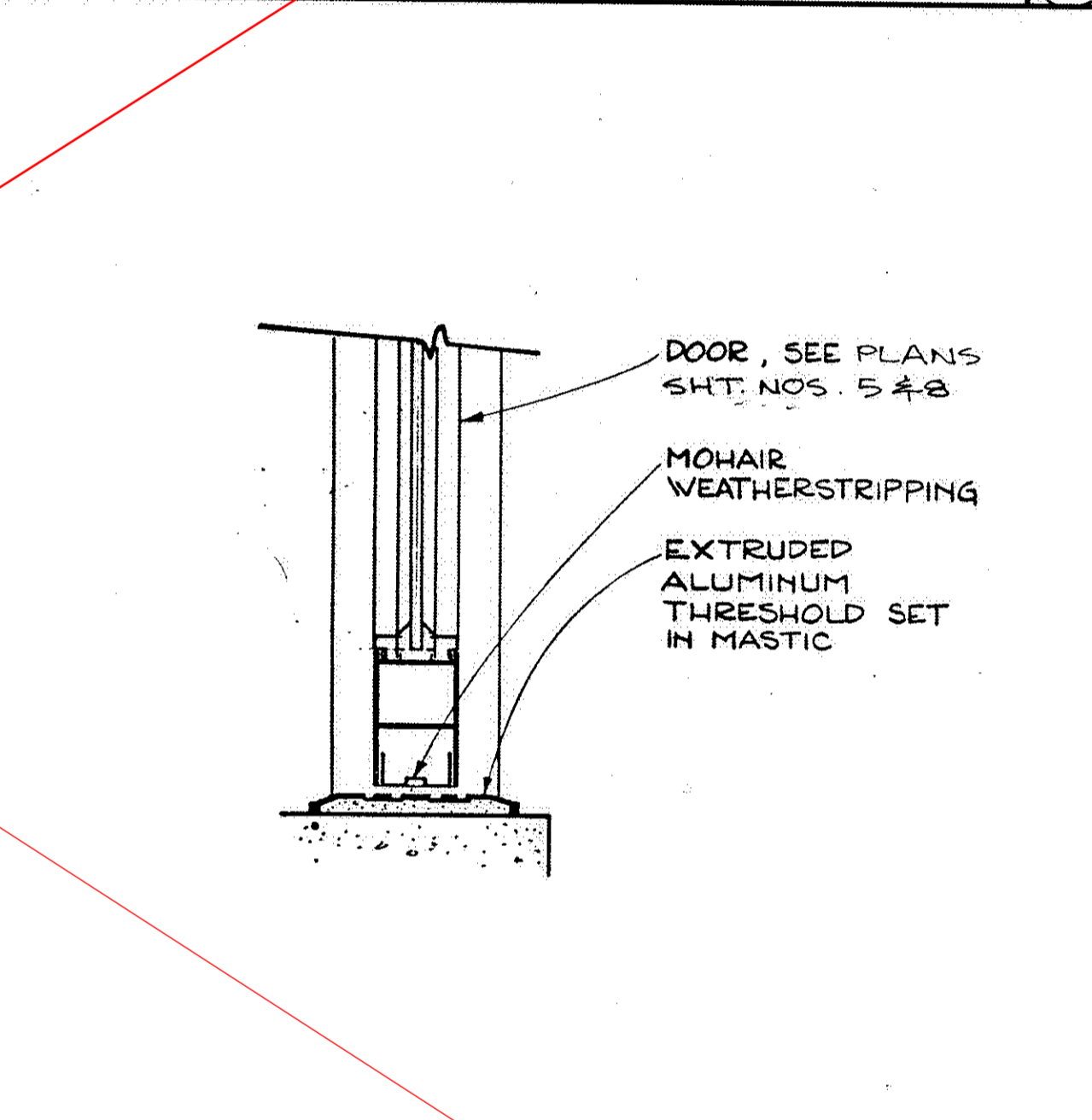
NORTH ELEVATION
SCALE: 1/4" = 1'-0"



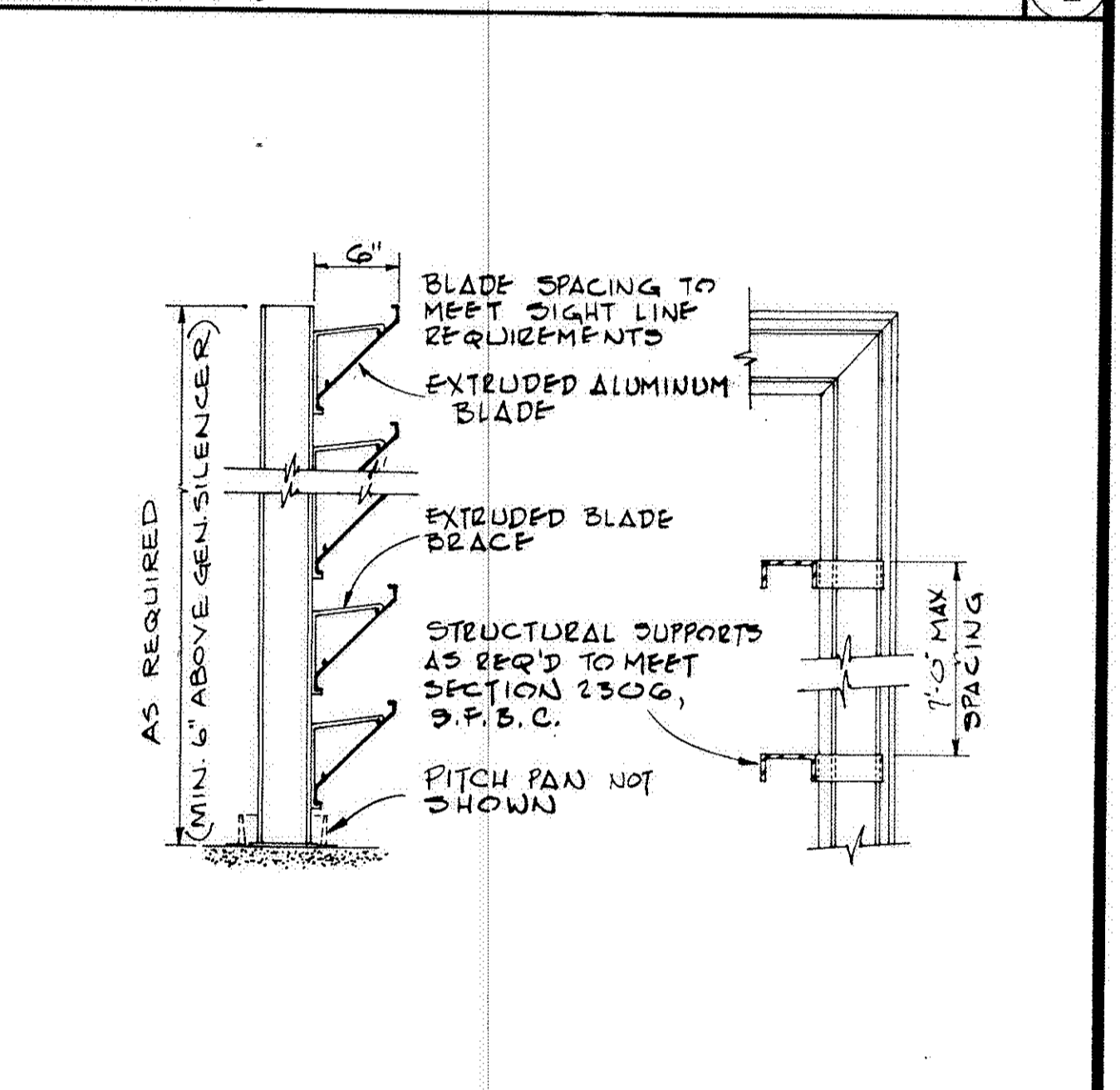
WEST ELEVATION / SECTION
SCALE: 1/4" = 1'-0"



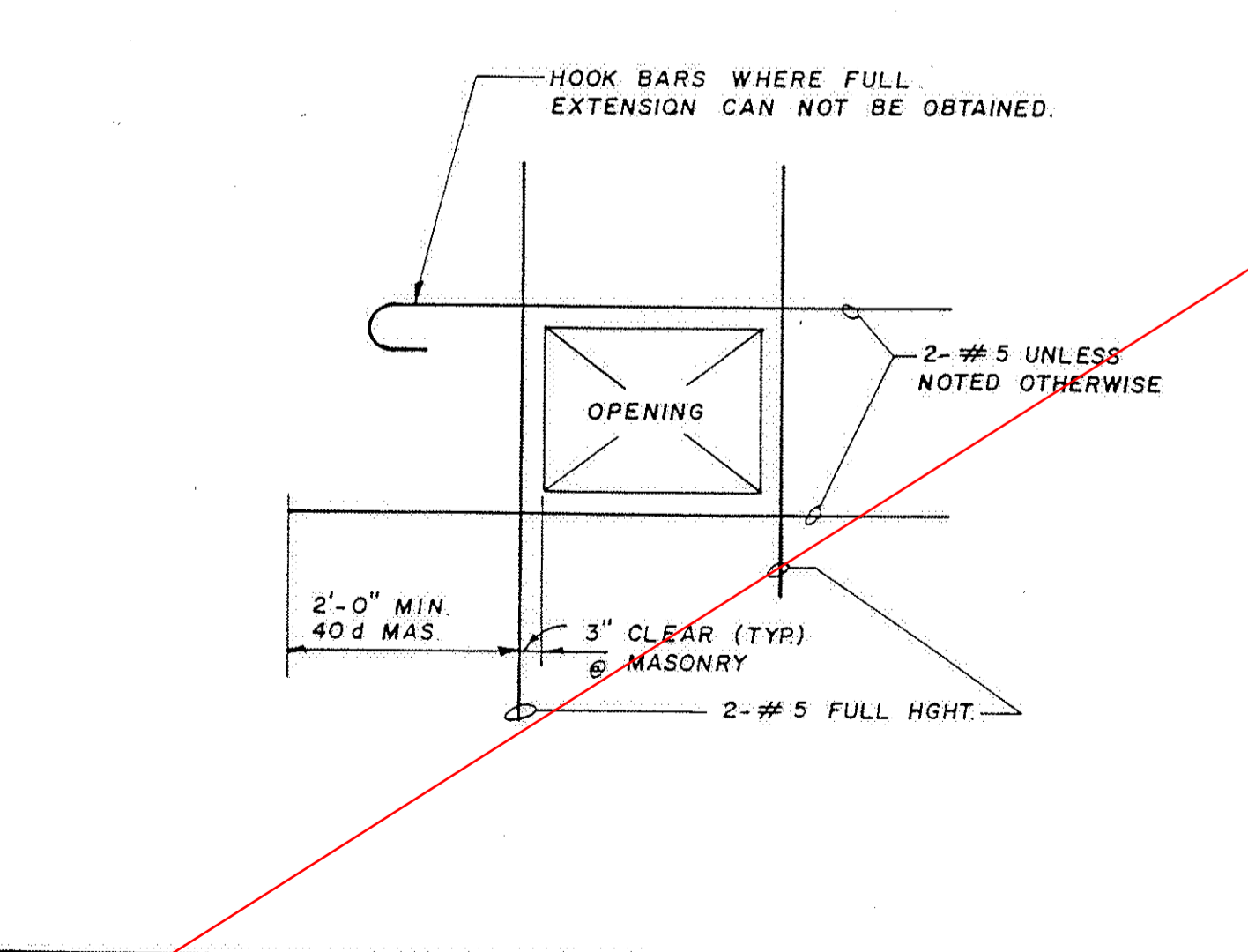
EAST ELEVATION
SCALE: 1/4" = 1'-0"



SILL @ ENTRY DOOR
SCALE: 3" = 1'-0"



EQUIPMENT SCREEN
SCALE: 1" = 1'-0"

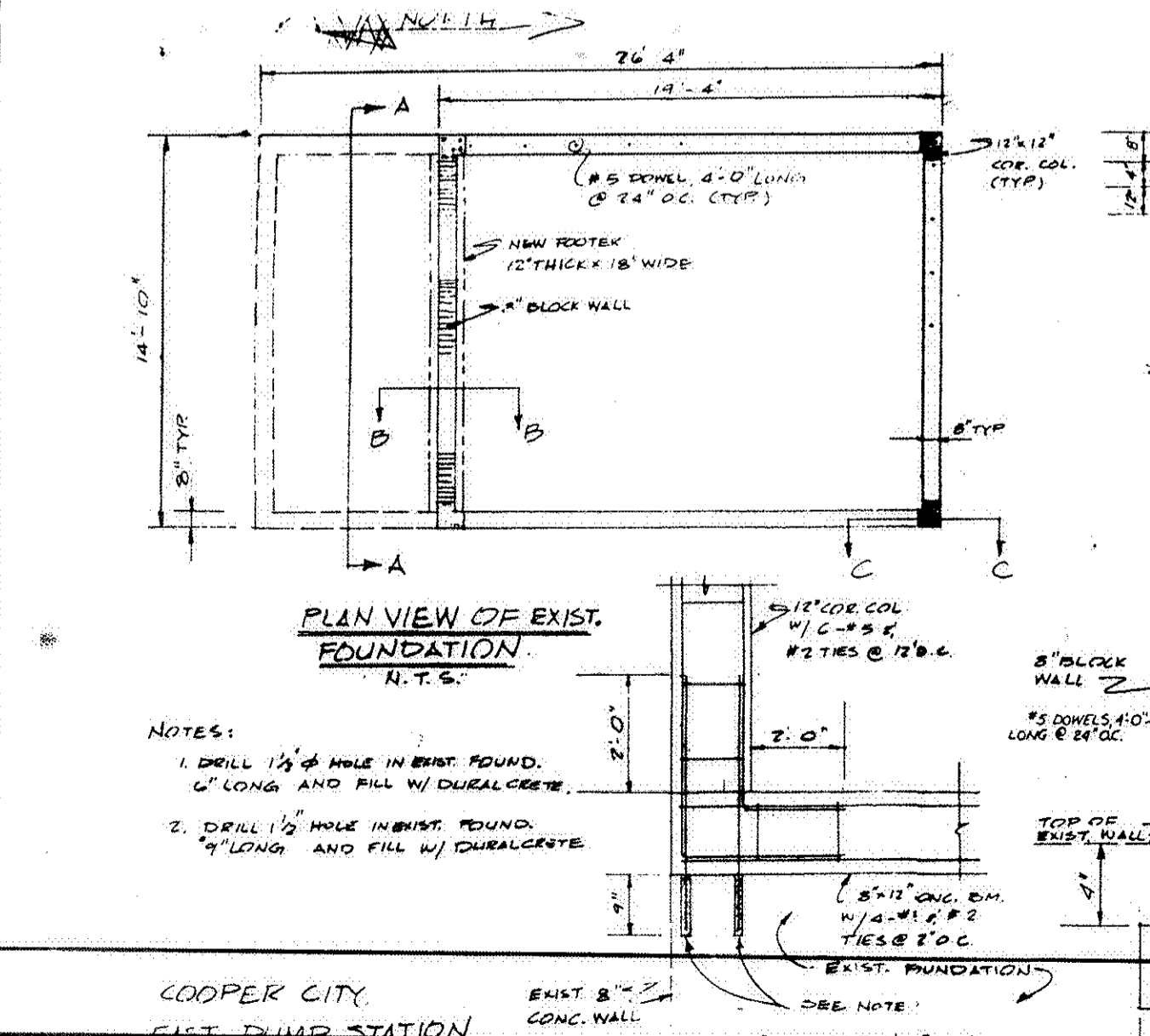


TYPICAL REINFORCING AT MASONRY WALL OPENINGS
NOT TO SCALE

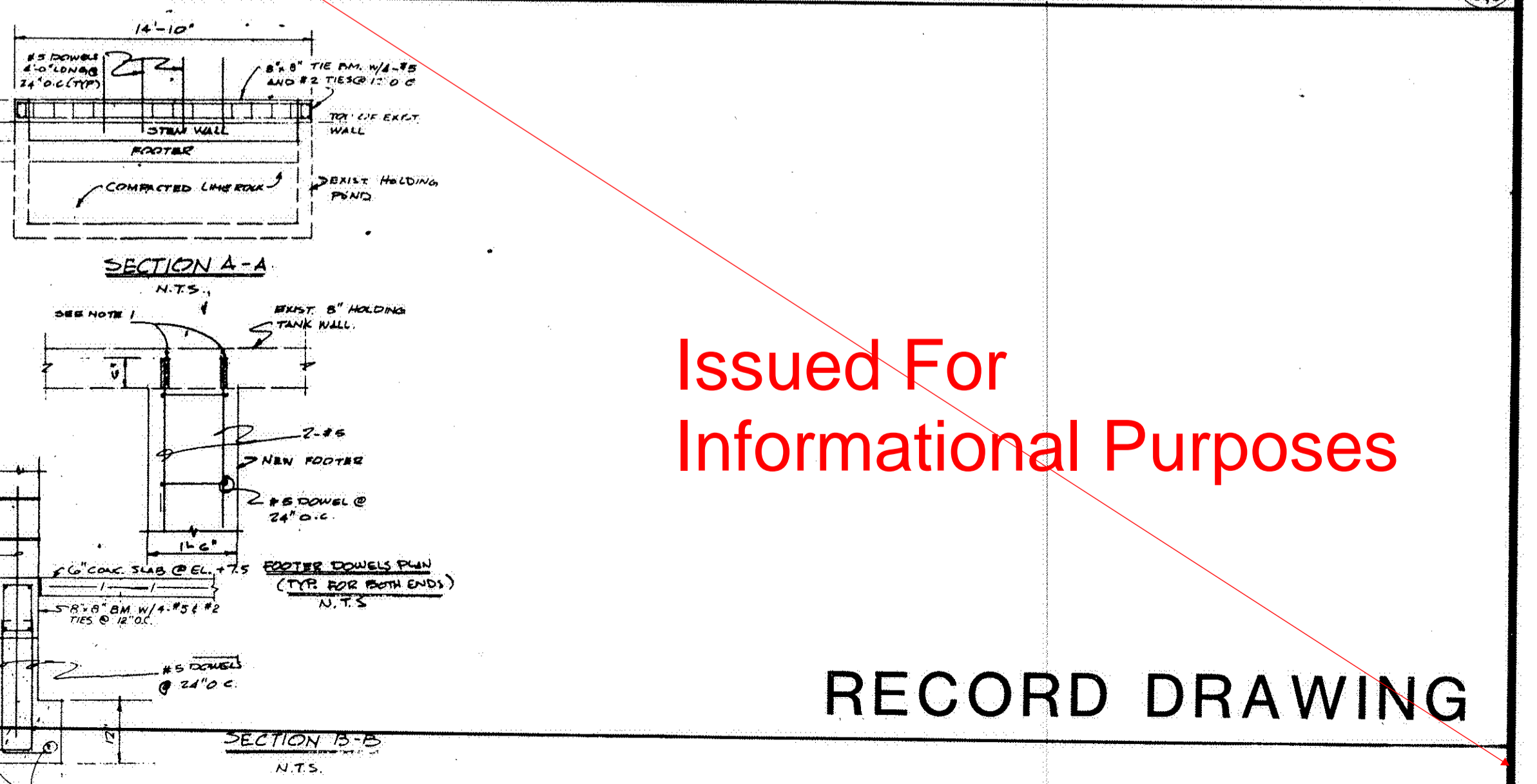
GENERAL NOTES:

1. ALL REINFORCED CELLS OF MASONRY SHALL BE CEMENT-GROUTED.
2. ALL NON-GROUTED CELLS OF MASONRY SHALL BE INSULATED.
3. 8" x 8" CONCRETE LINTEL WITH 4-#4 5 #2 STIRRUPS AT 12" ON CENTER TYPICAL AT ALL OPENINGS.
4. ALL MUCK AND YIELDING MATERIAL WITHIN THE LIMIT OF CONSTRUCTION SHALL BE REMOVED AND REPLACED WITH CLEAN FILL MATERIAL WHICH SHALL BE COMPACTED AND SHIPPED TO CONFORM TO THE REQUIRED SECTION. COMPACTED AREAS, AS SHOWN ON THE PLANS AND/OR AS DETERMINED BY THE ENGINEER, SHALL BE COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE, AS DETERMINED BY AASHTO T-180, LATEST REVISION. IF STABILIZATION IS DETERMINED NECESSARY BY THE ENGINEER, MEET THE REQUIRED LBR-40. (SEE DETAIL C/6).

GENERAL NOTES



PLAN VIEW OF EXIST. FOUNDATION
N.T.S.



SECTION A-A
SECTION B-B
N.T.S.

Issued For Informational Purposes

RECORD DRAWING

DESIGNED	K.Y.	SUBMITTED	3/18/89	9-4-85
DRAWN	D.P.A.	PROJECT ENGINEER	3/18/89	9-4-85
CHECKED	B.H.C.	RECOMMENDED	1/14/91	9-4-85
REV	DATE	BY	DESCRIPTION	
2	5/20/89	ALL	RECORD DRAWING	
1	3/18/89	D.P.A.	INCLUDE SHT #8 (GEN BLDG @ EAST W.W.T.P.) IN PROJECT	

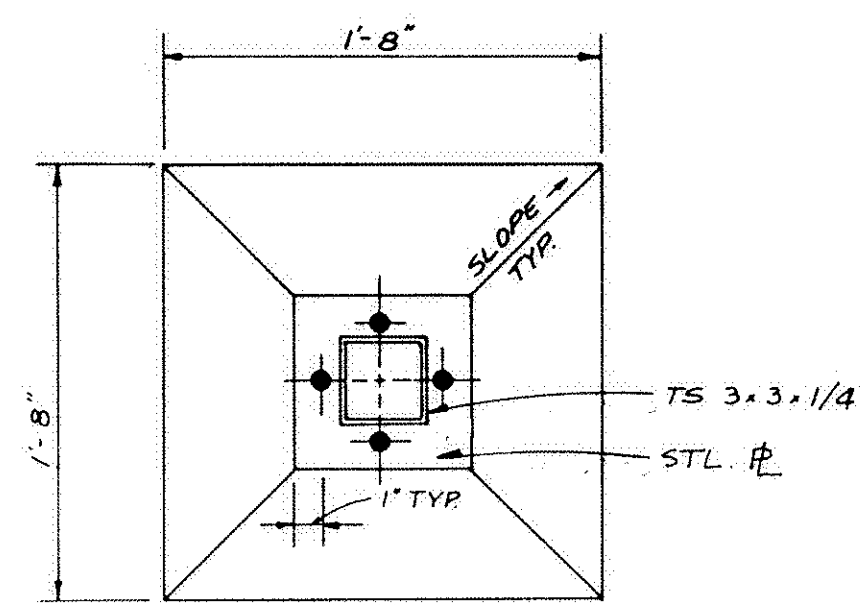
SCALE:	AS SHOWN
DESIGNED	K.Y.
DRAWN	D.P.A.
CHECKED	B.H.C.
SUBMITTED	3/18/89
PROJECT ENGINEER	3/18/89
RECOMMENDED	1/14/91
DATE	9-4-85

COOPER CITY
PUMP STATION

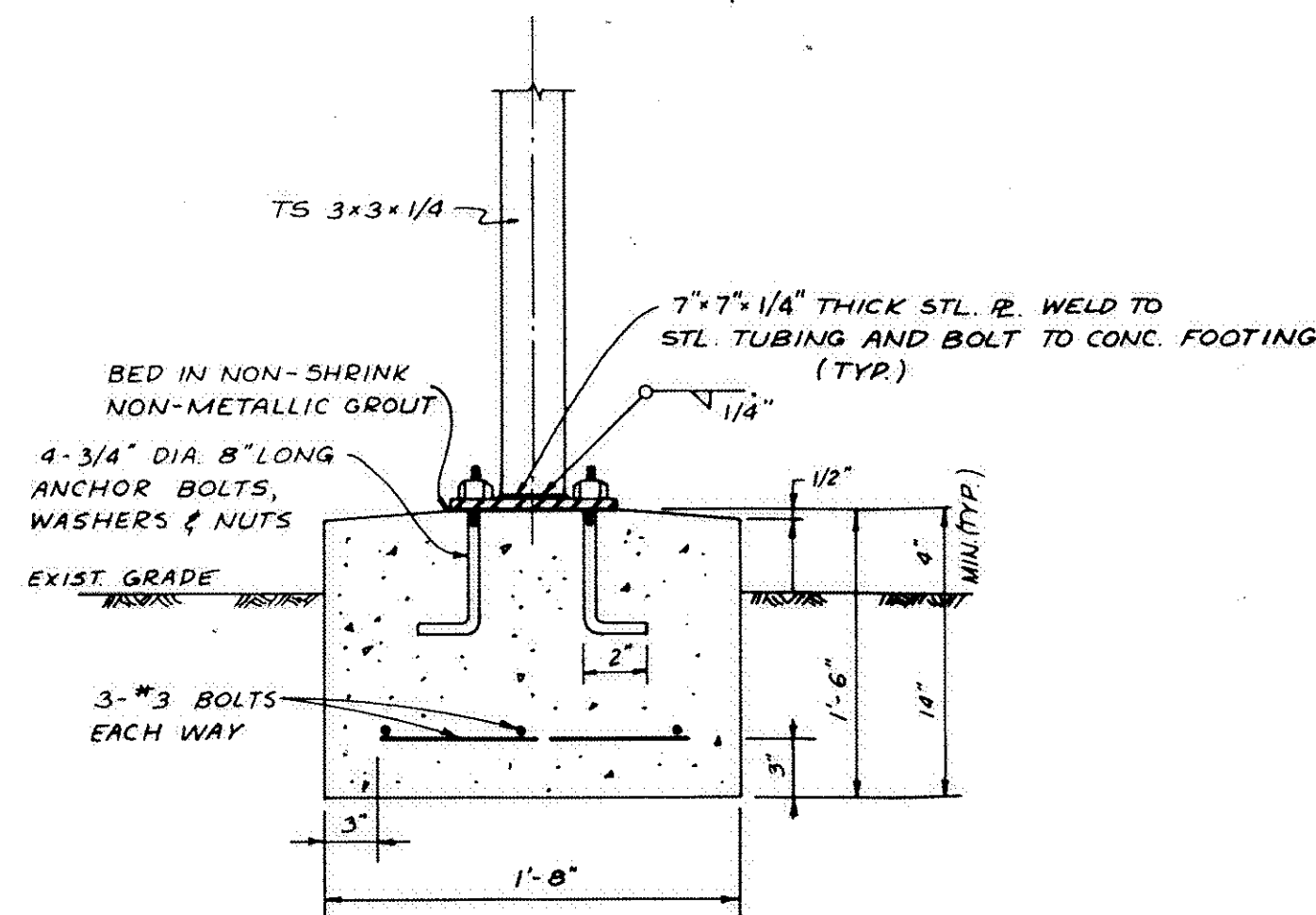
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

1975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

TOWN OF DAVIE AND COOPER CITY, FLORIDA		SHEET
COOPER CITY PUMP STATIONS		8
EAST PLANT PUMP STATION		
GENERATOR AND CONTROL BUILDING		OF 160 SHEETS

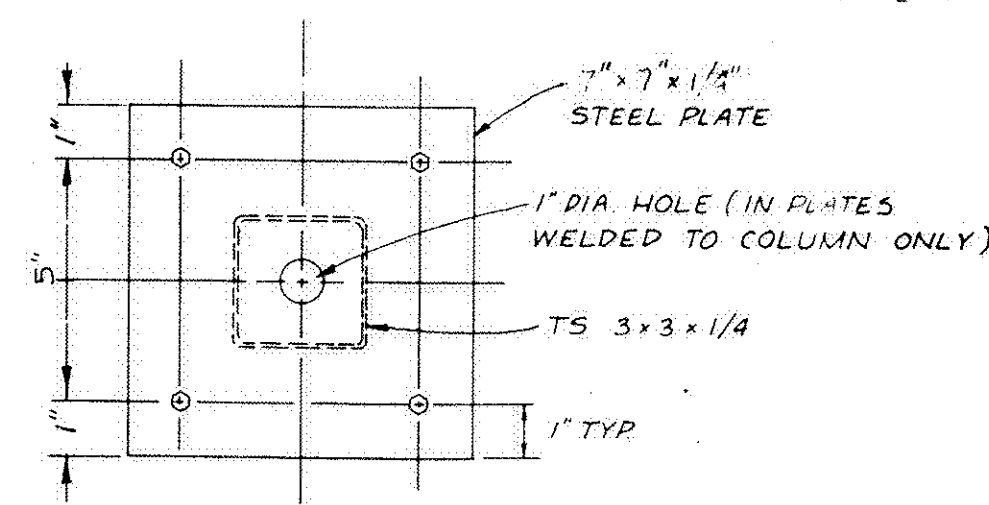
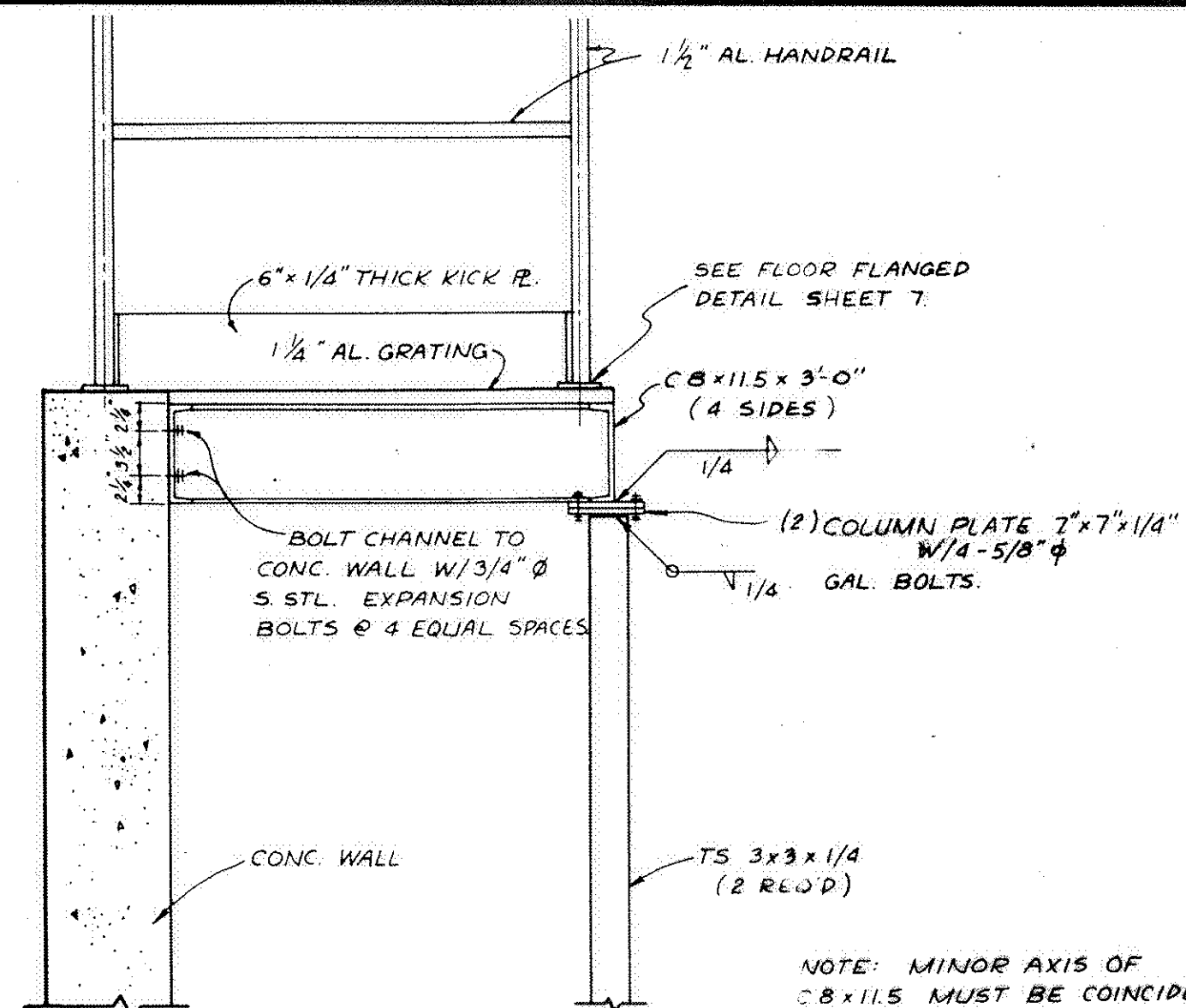


PLAN



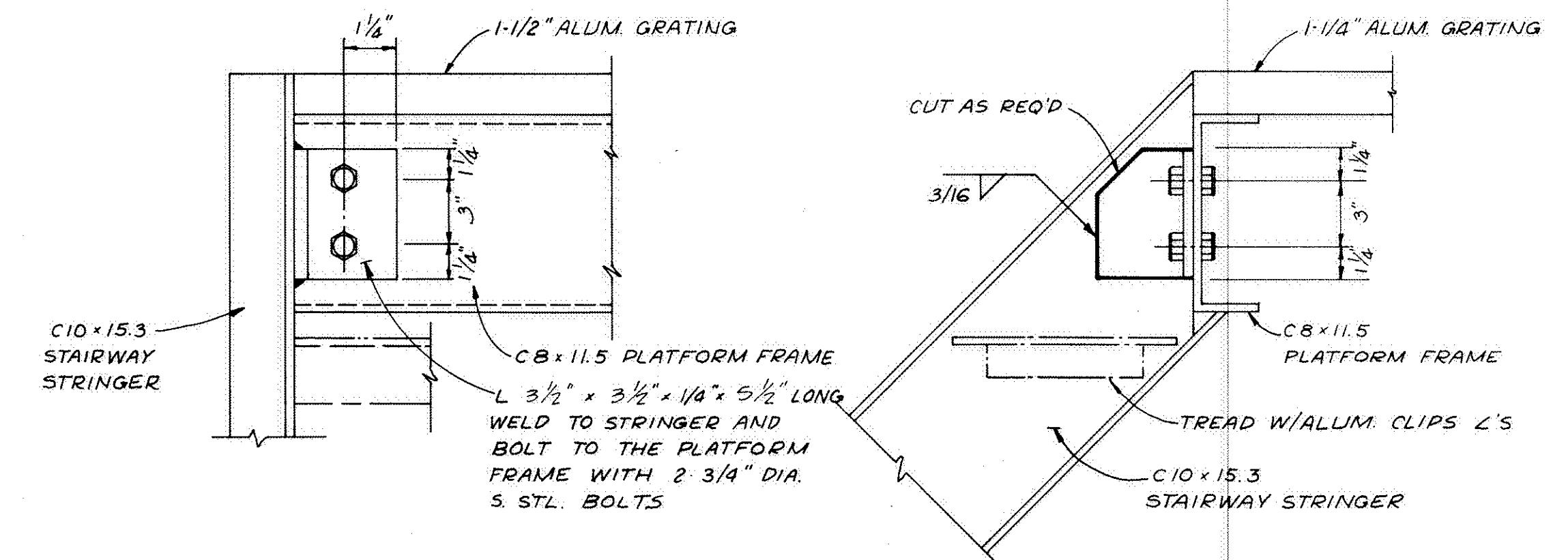
ELEVATION

COLUMN FOOTING DETAIL
N.T.S.

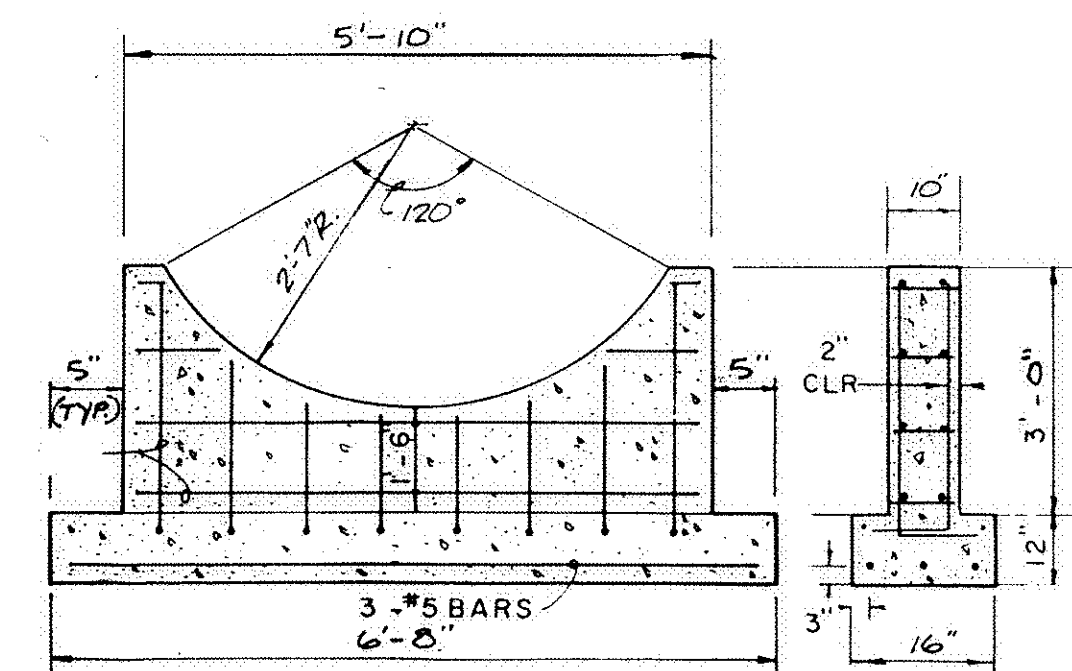


COLUMN PLATE PLAN

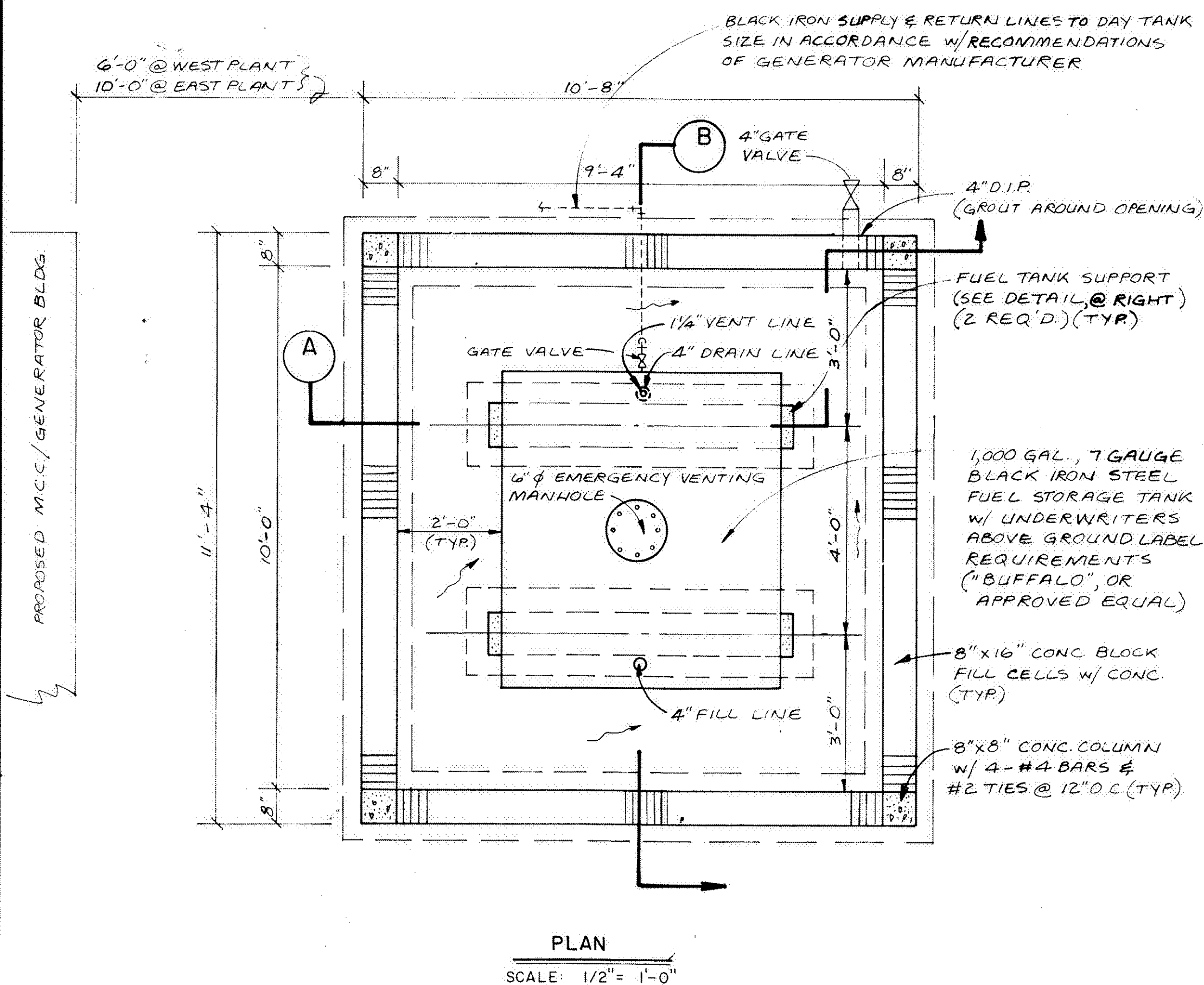
LANDING DETAIL
N.T.S.



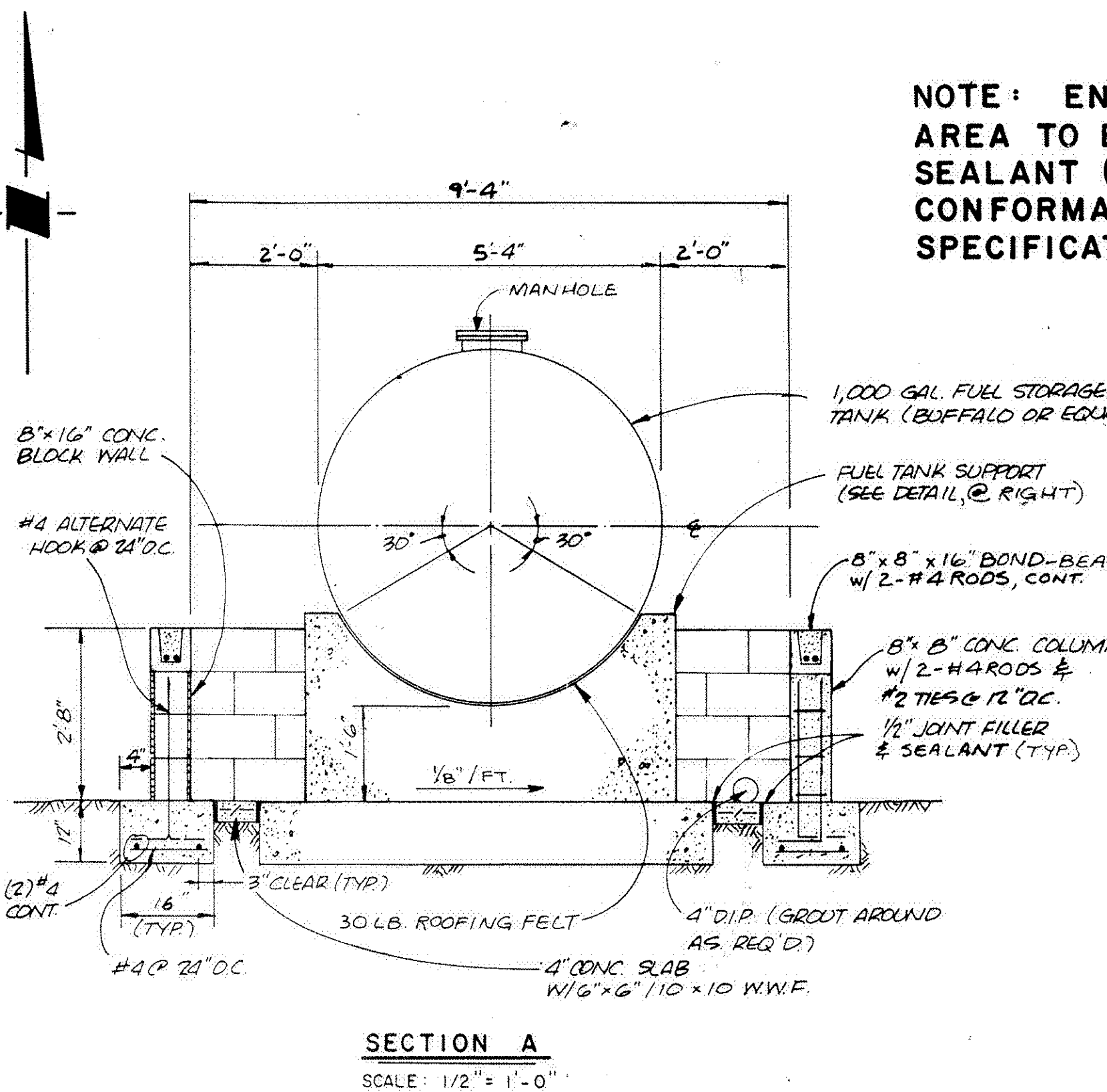
STAIRWAY STRINGER CONNECTION DETAIL
N.T.S.



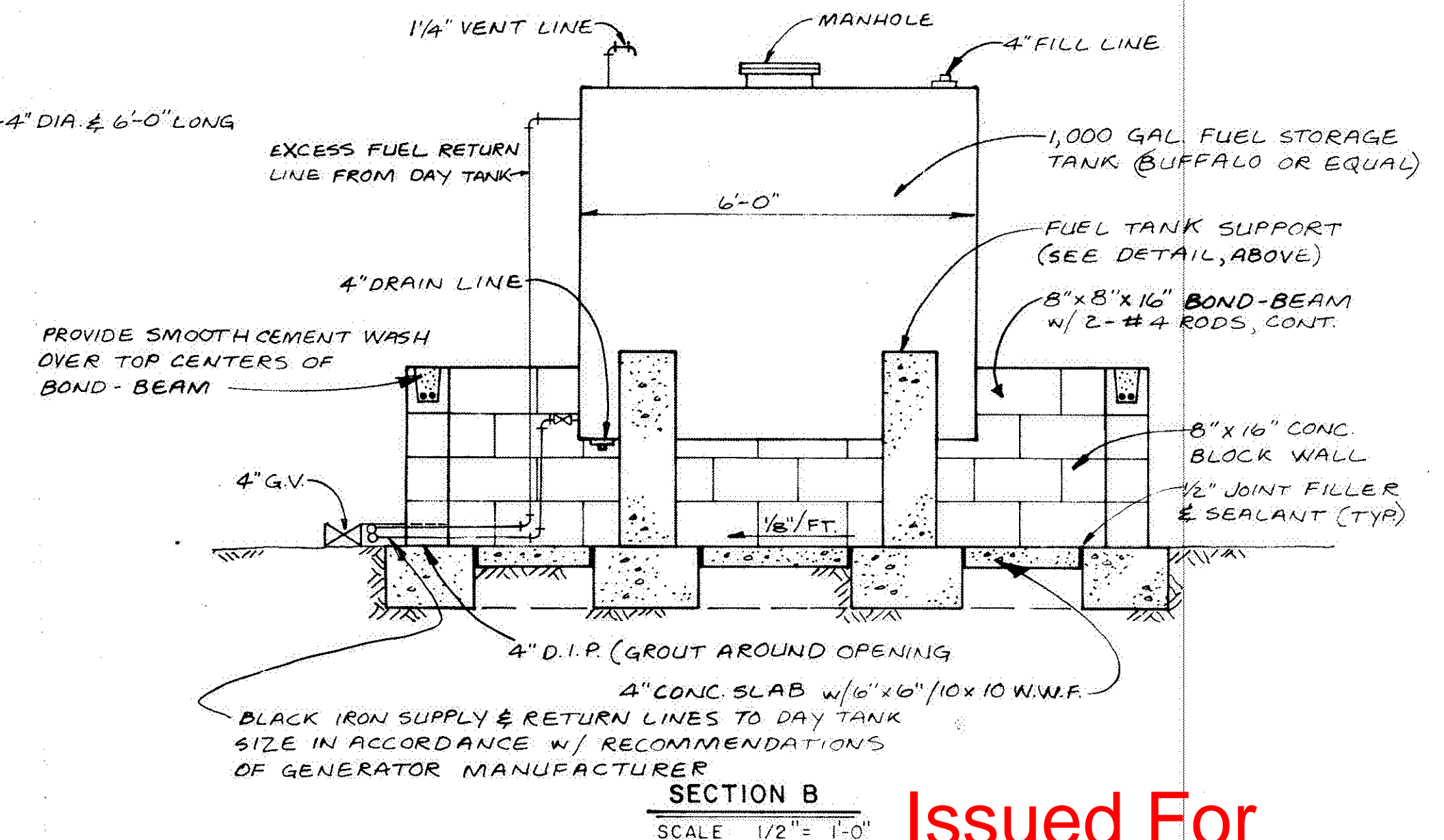
TYPICAL FUEL TANK SUPPORT DETAIL
NOT TO SCALE



PLAN
SCALE: 1/2" = 1'-0"



SECTION A
SCALE: 1/2" = 1'-0"



SECTION B
SCALE: 1/2" = 1'-0"

NOTE: FINISHED SLAB ELEVATIONS
7.50' - EAST PLANT
12.00' - WEST PLANT

FUEL STORAGE TANK & CONTAINMENT STRUCTURE

SCALE: AS SHOWN

REV	DATE	BY	DESCRIPTION
2	5/28/85	ALG	RECORD DRAWING
1	5/28/85	DPA	MISC. REV.

DESIGNED	DRAWN	CHECKED
K.Y.	D.P.R.	B.H.C.

SUBMITTED	PROJECT ENGINEER	RECOMMENDED
3/18/85	3/18/85	17/141
9-4-85	DATE	DATE

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

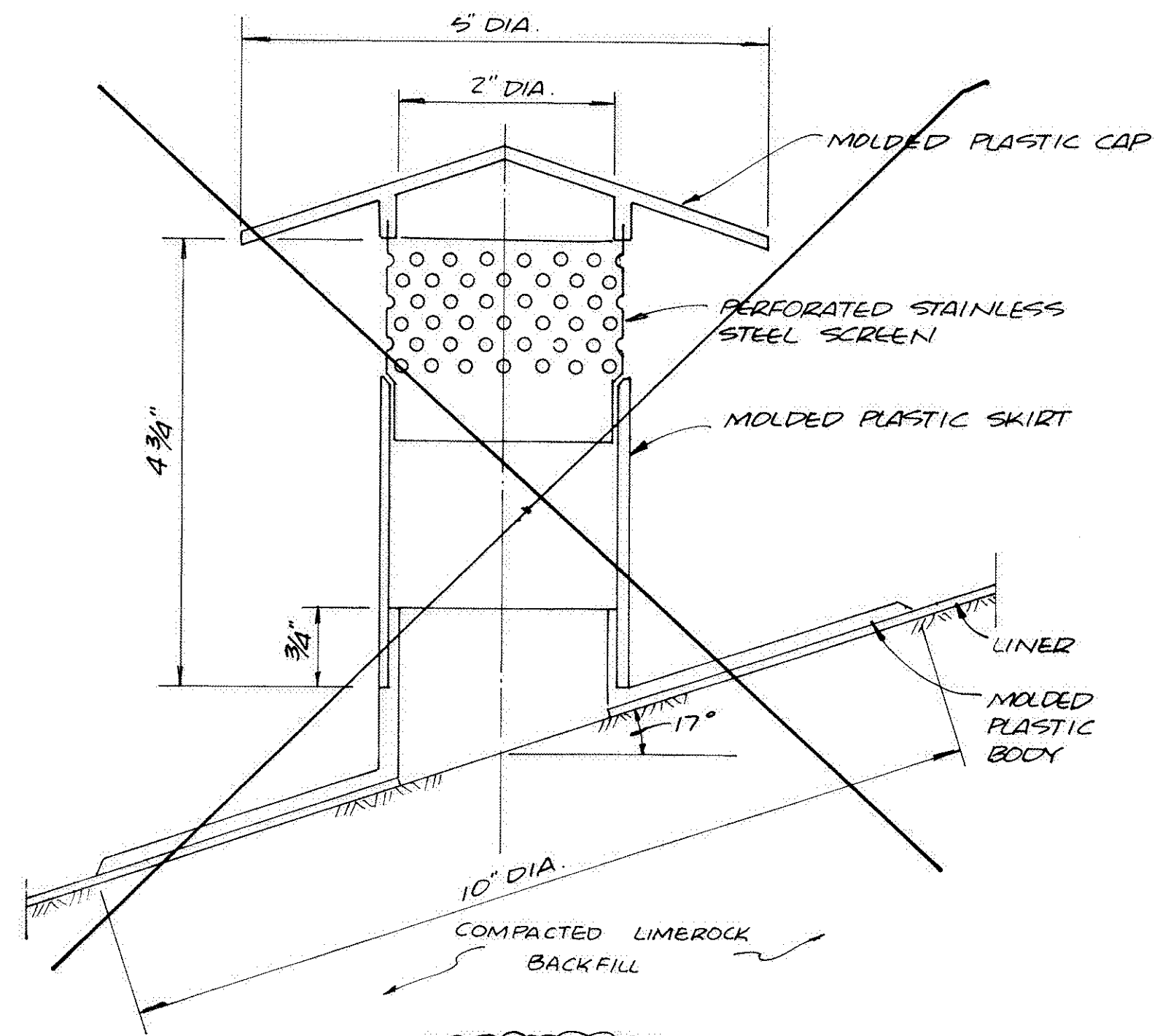
5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
STRUCTURAL DETAILS

D
5,8
SHEET
9
OF 10 SHEETS

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Informational Purposes

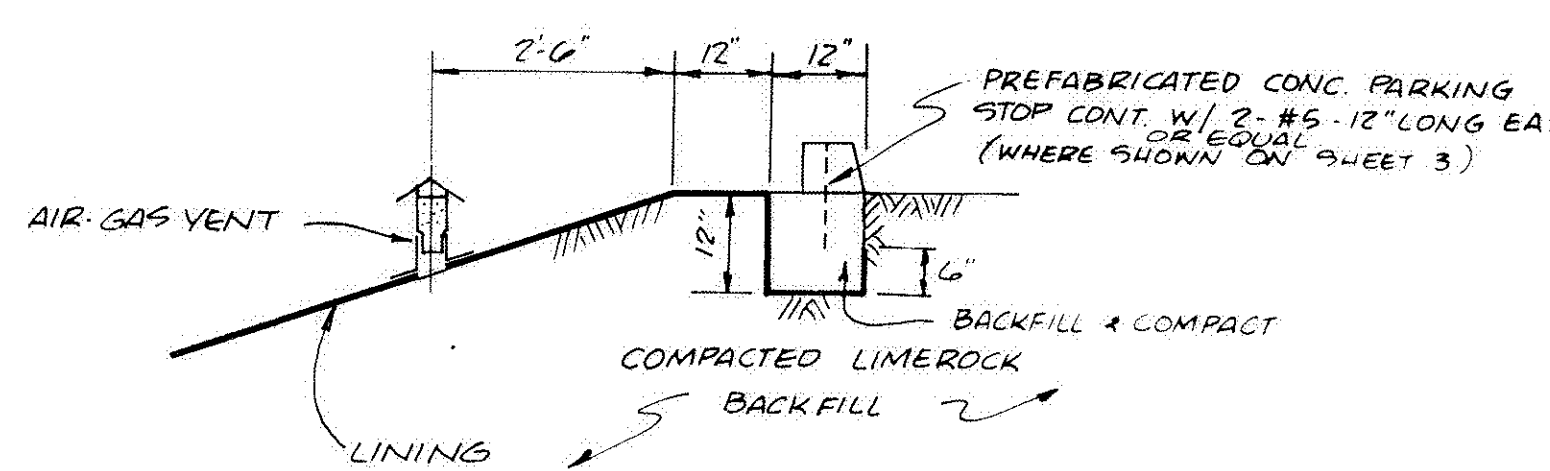
RECORD DRAWING



AIR-GAS VENT

N.T.S.

A



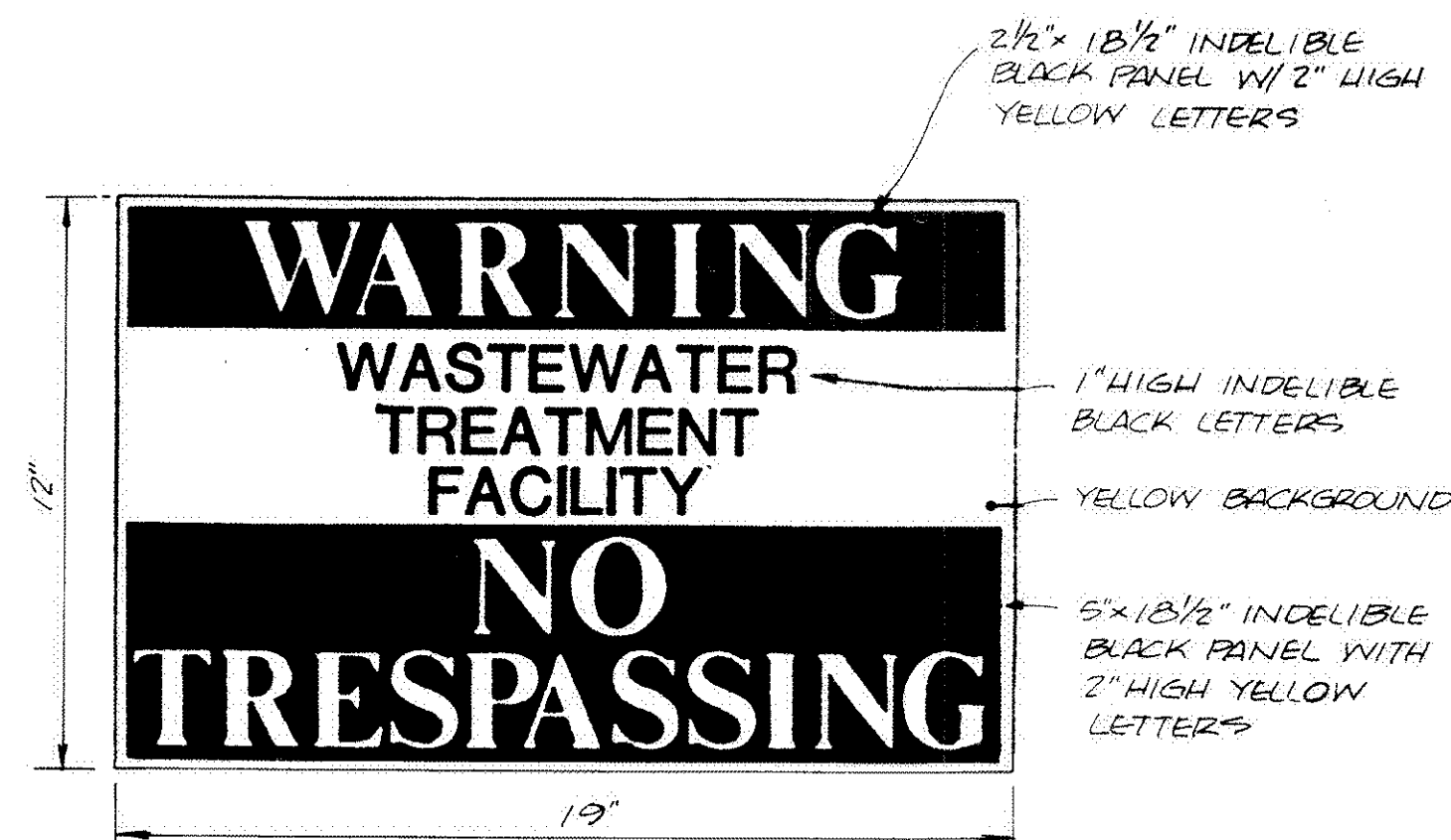
TRENCH - ANCHORING DETAIL

N.T.S.

D

OVERFLOW PIPE SECTION

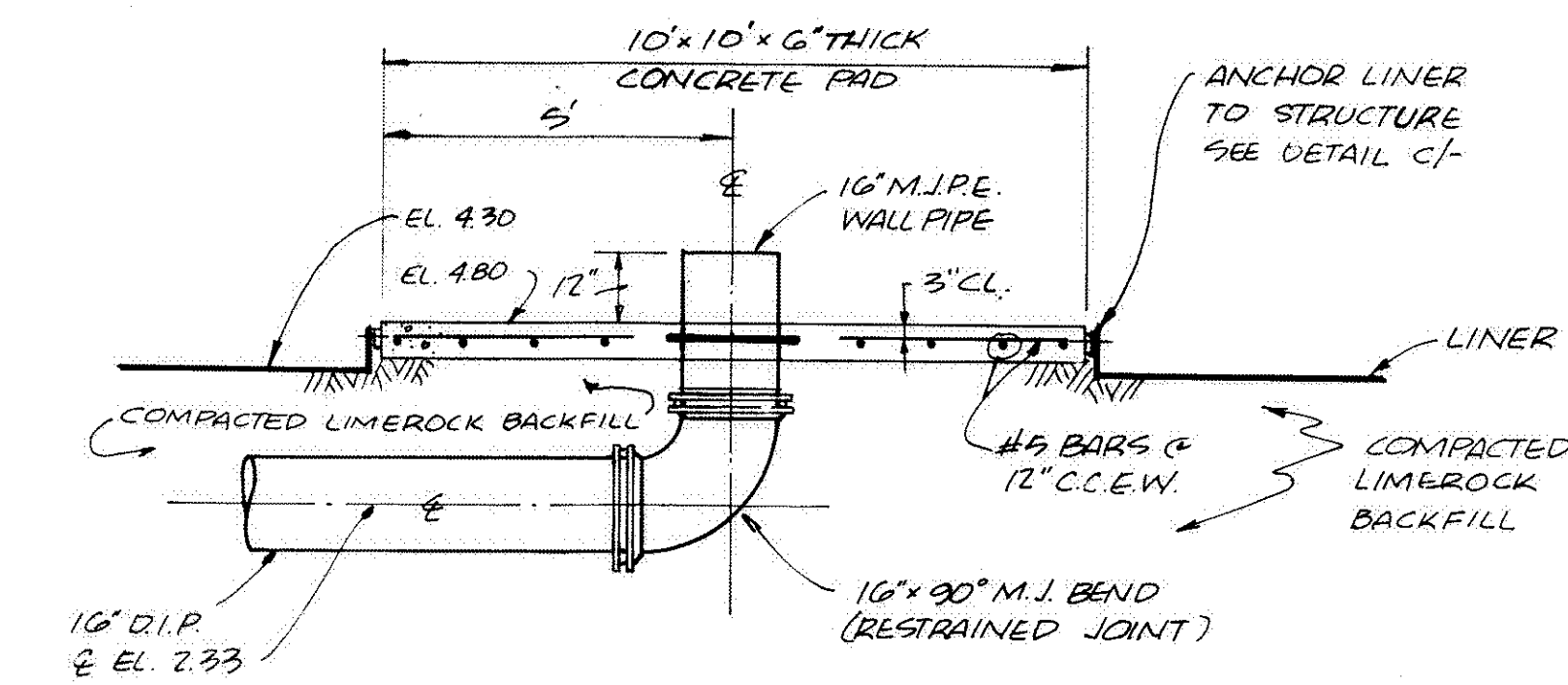
SCALE: 1"=5' VERT. 1"=5' HORIZ



WARNING SIGN DETAIL

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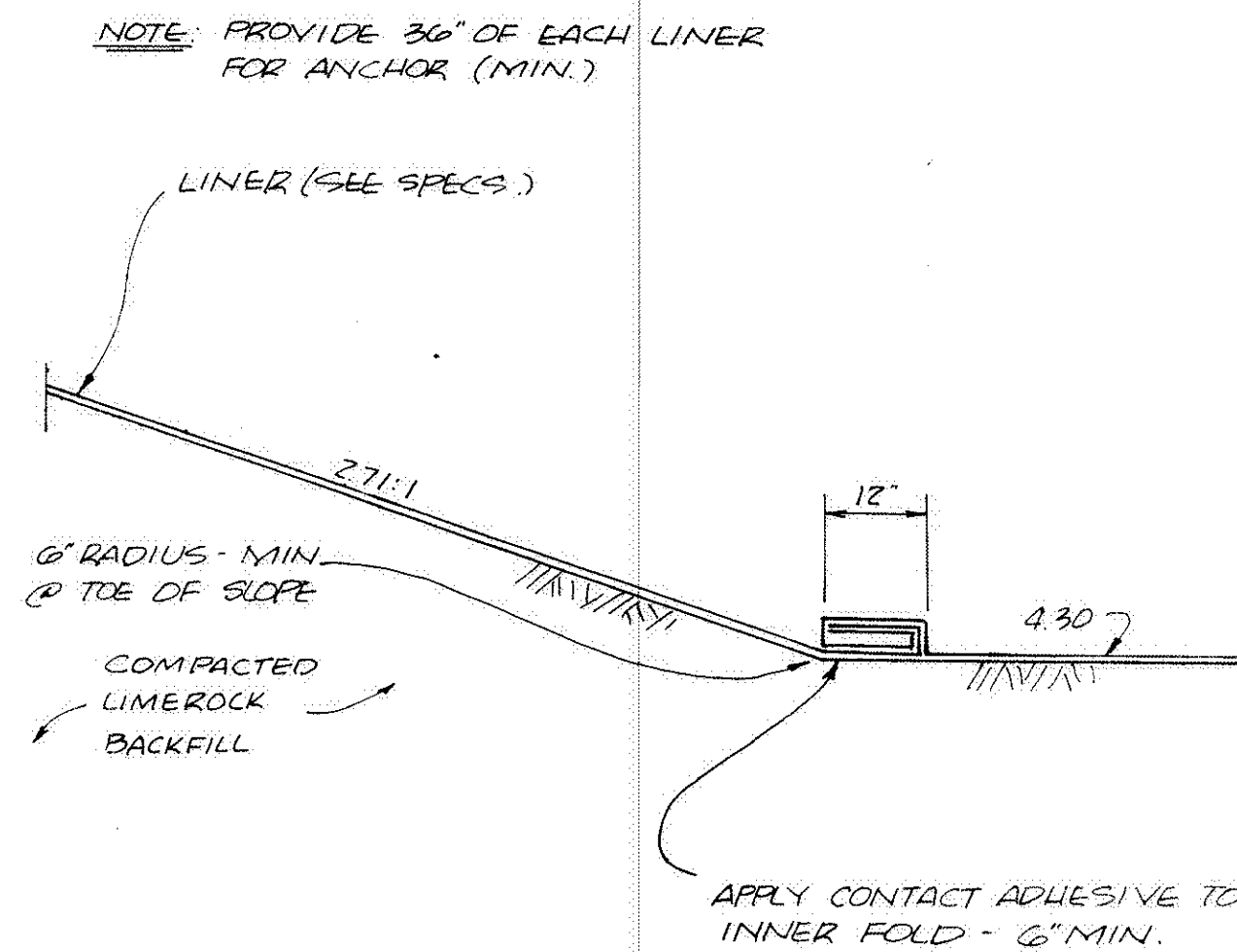
E



SPLASH PLATFORM DETAIL

N.T.S.

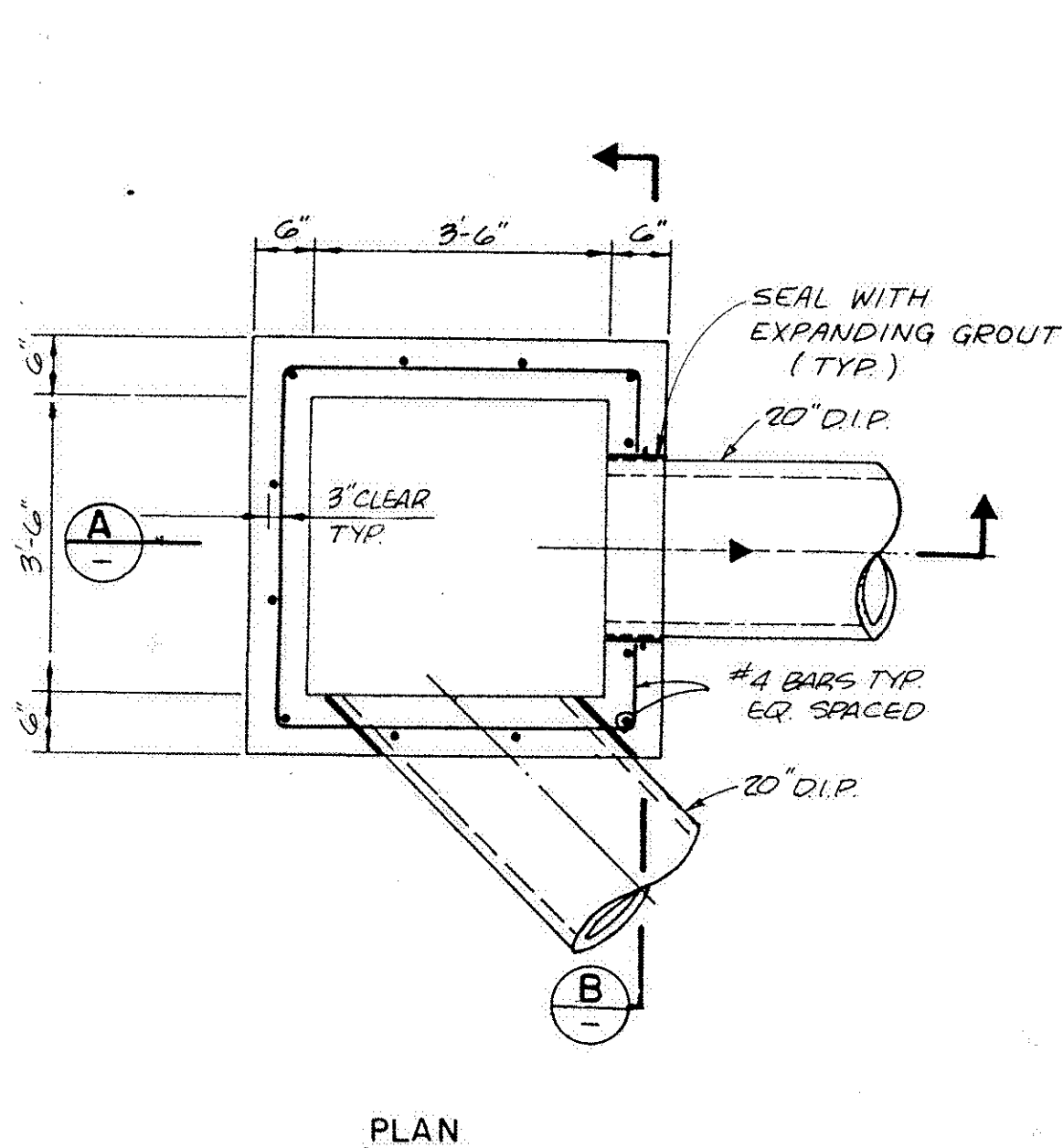
F



LINER DETAIL AT TOE OF SLOPE

N.T.S.

G



SUMP DETAIL

N.T.S.

H

SCALE:

N.T.S.

DESIGNED: K.Y.

DRAWN: D.P.R.

CHECKED: B.H.C.

SUBMITTED:

PROJECT ENGINEER:

RECOMMENDED:

31849

9-4-85

17/41

9/4/85

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313

LINER - SEAL TO PIPE DETAIL

N.T.S.

TRANSFORMER PAD

N.T.S.

TOWN OF DAVIE AND COOPER CITY, FLORIDA

COOPER CITY PUMP STATIONS

HOLDING POND DETAILS

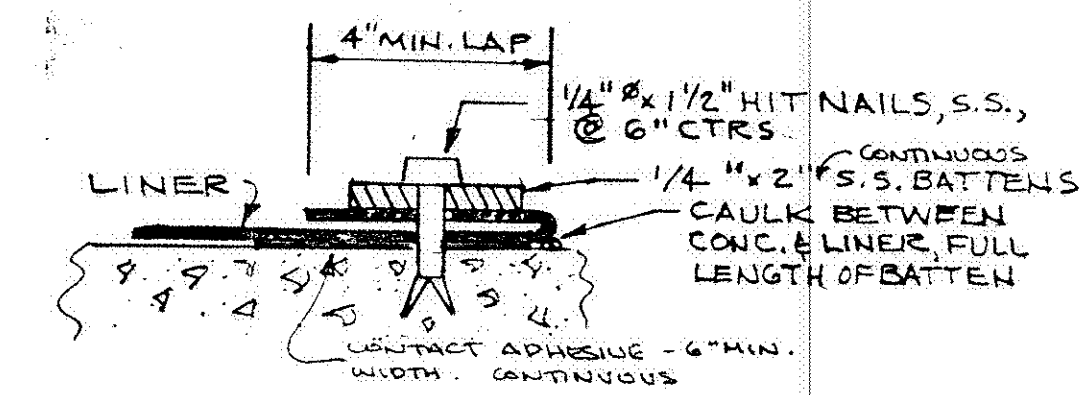
SHEET

10

OF 16 SHEETS

Issued For Informational Purposes

NOTE: PLACE CAULKING TAPE UNDER THE BATTEN STRIP AT THE RAMP SET POINT.



ANCHORING AND SEALING DETAIL

N.T.S.

C

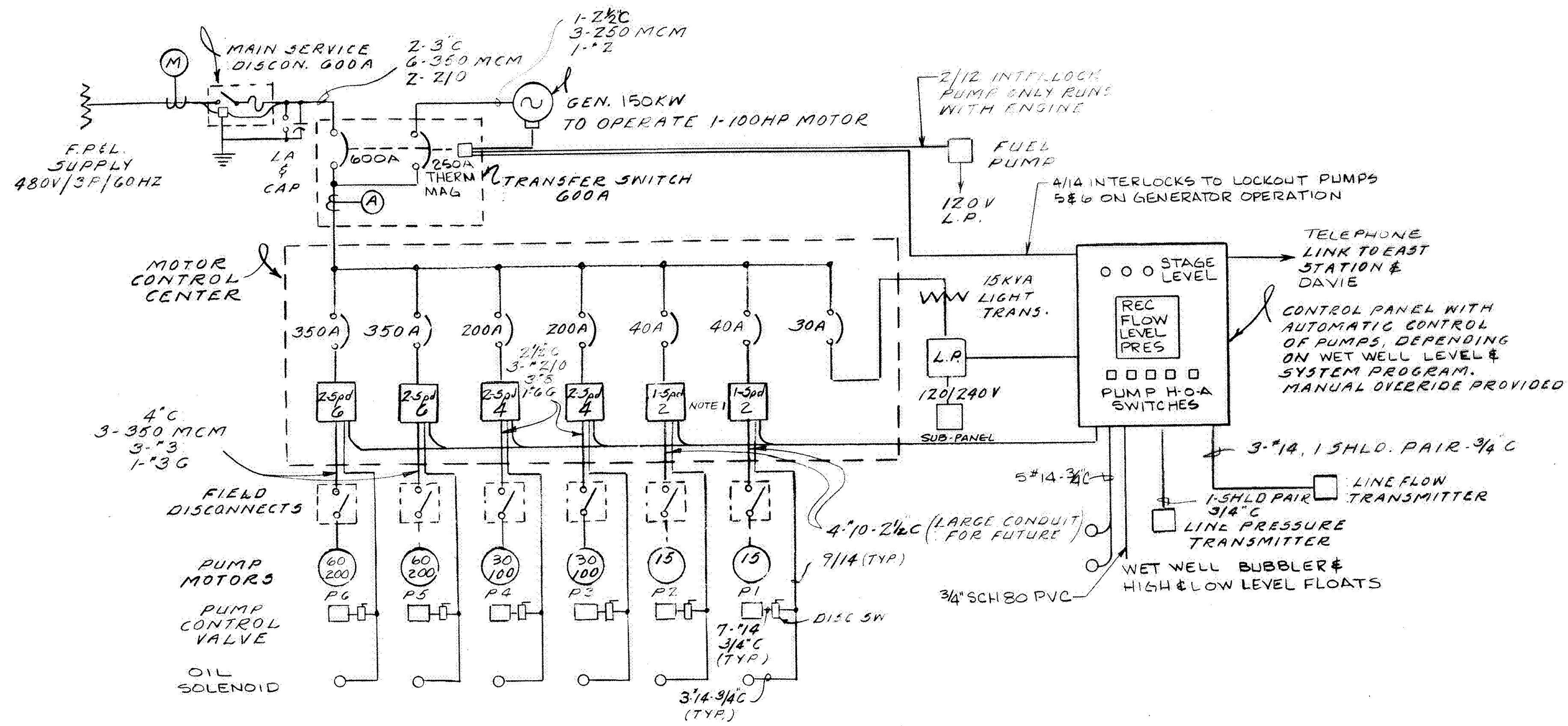
RECORD DRAWING

F.P. & L. POLE MOUNTED TRANSFORMER

FILE

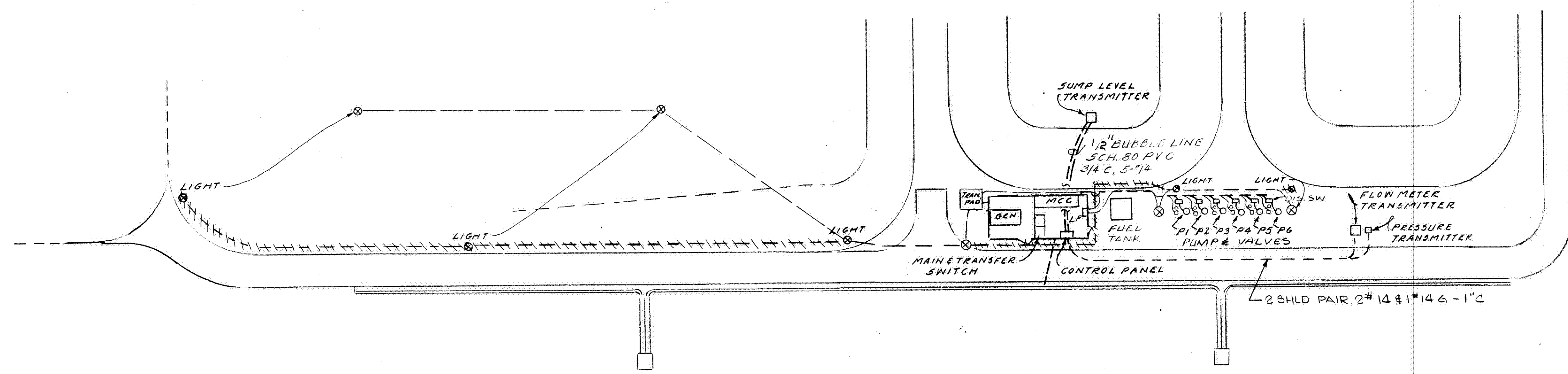
JOB NO.

PAS: 20232 4 13 EC



WEST PLANT PUMP STATION SINGLE LINE DIAGRAM

- NOTE:**
1. SPACE FOR TWO FUTURE SECTION OF MOTOR CONTROL CENTER IS REQUIRED TO REPLACE SIZE 2 STARTERS FOR PUMP P1&P2 WITH 2 SPEED SIZE 4 STARTERS. CONDUIT TO BE SIZED FOR FUTURE
 2. ALL WIRING SHALL BE GROUPED AND TAGGED WITH DESTINATION AT EACH END. TAGS USED SHALL BE NYLON WITH NYLON TIE-WRAPS
 3. CONTROL WIRING MAY BE GROUPED IN ONE CONDUIT BUT MUST BE PROPERLY GROUPED AND IDENTIFIED AT EACH END.
 4. ONLY INSTRUMENT POWER SUPPLY SHALL BE RUN WITH SHIELDED CABLES. GROUND SHIELD AT ONLY ONE END OF CABLE. INSULATE SHIELD FROM OTHER GROUNDS.

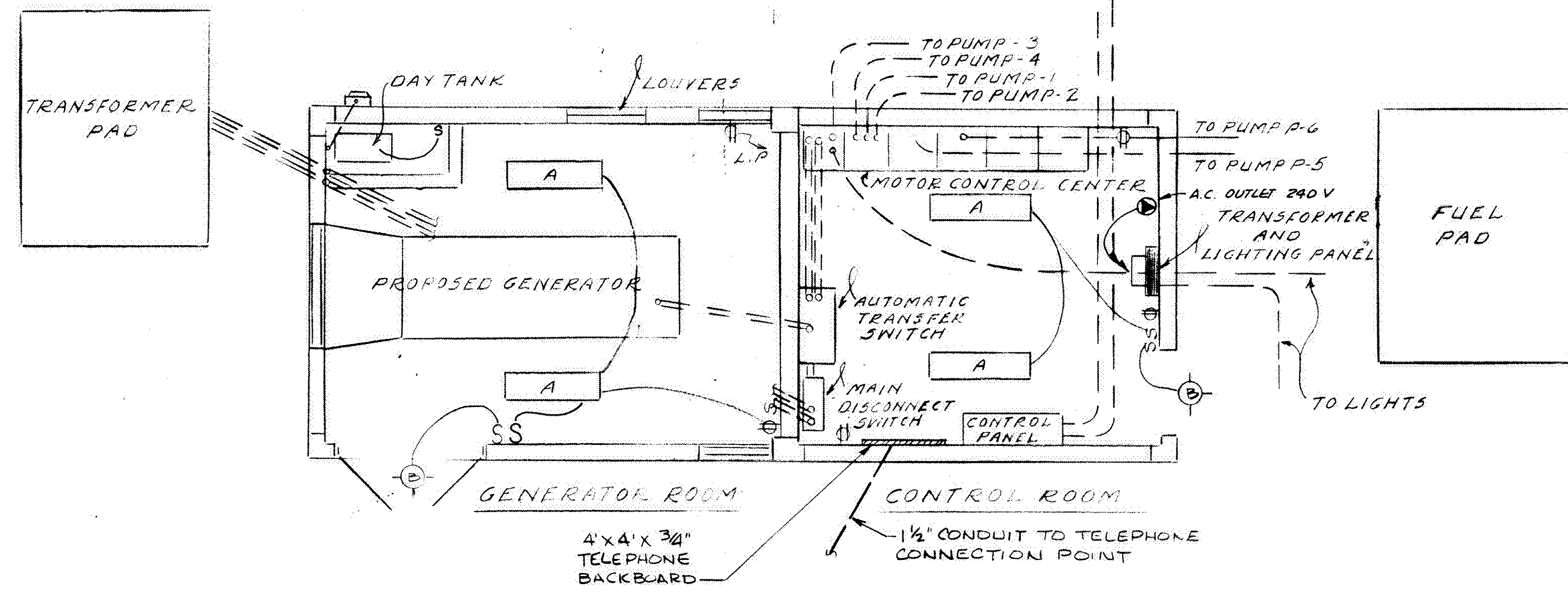


ELECTRICAL-SITE PLAN
SCALE: 1"=20'-0"

Issued For
Informational Purposes

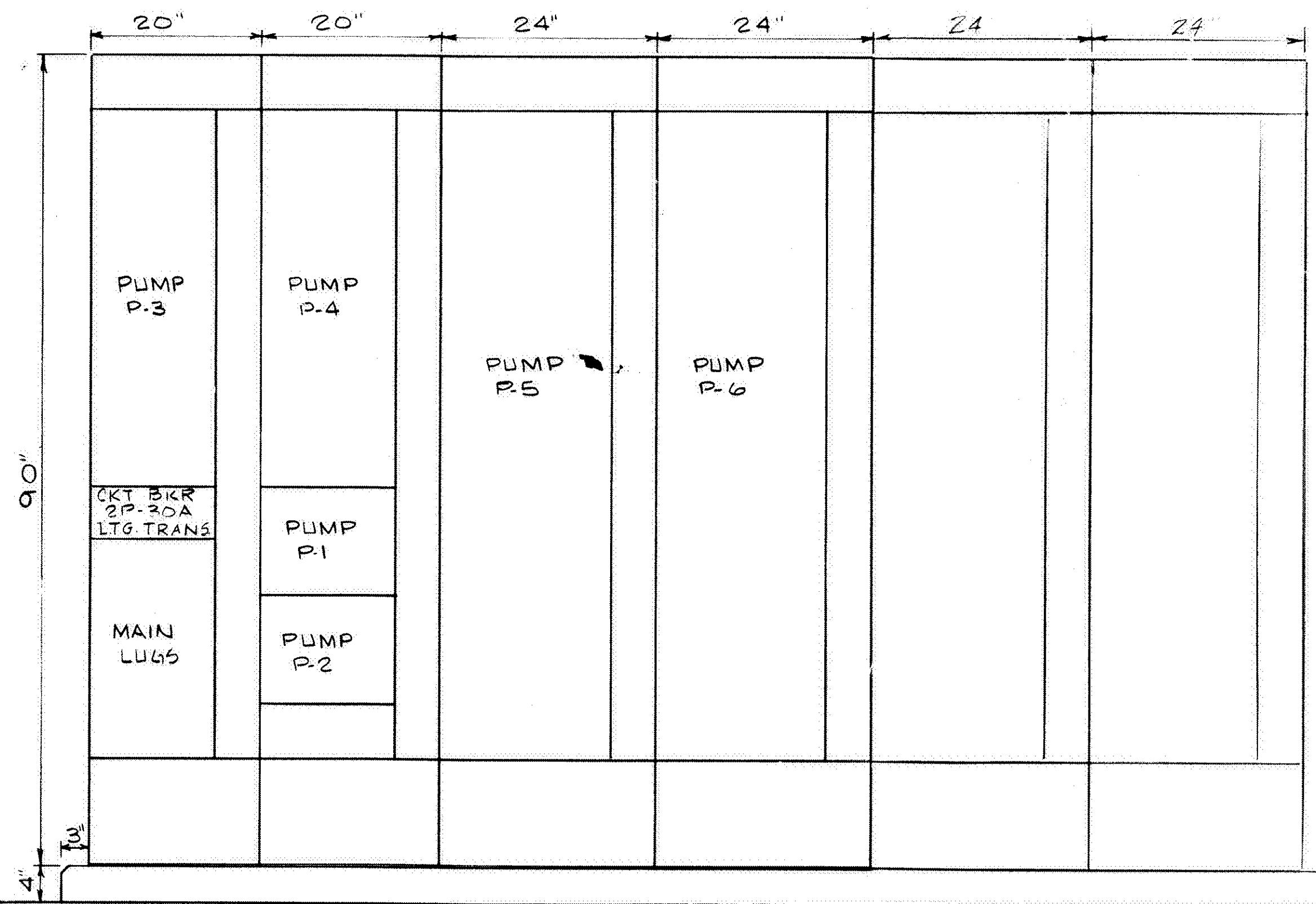
RECORD DRAWING

TOWN OF DAVIE AND COOPER CITY, FLORIDA COOPER CITY PUMP STATIONS WEST PLANT PUMP STATION ELECTRICAL PLAN		SHEET 12 OF 10 SHEETS
SCALE: 1"=20'	DESIGNED: ENP DRAWN: WAR CHECKED: ENP	SUBMITTED PROJECT ENGINEER: <i>Ben H. Chen</i> 31849 9-4-85 RECOMMENDED: <i>William R. ...</i> 17141 9/4/85
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.		5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313
1 9/27/85 OLS RECORD DRAWING		

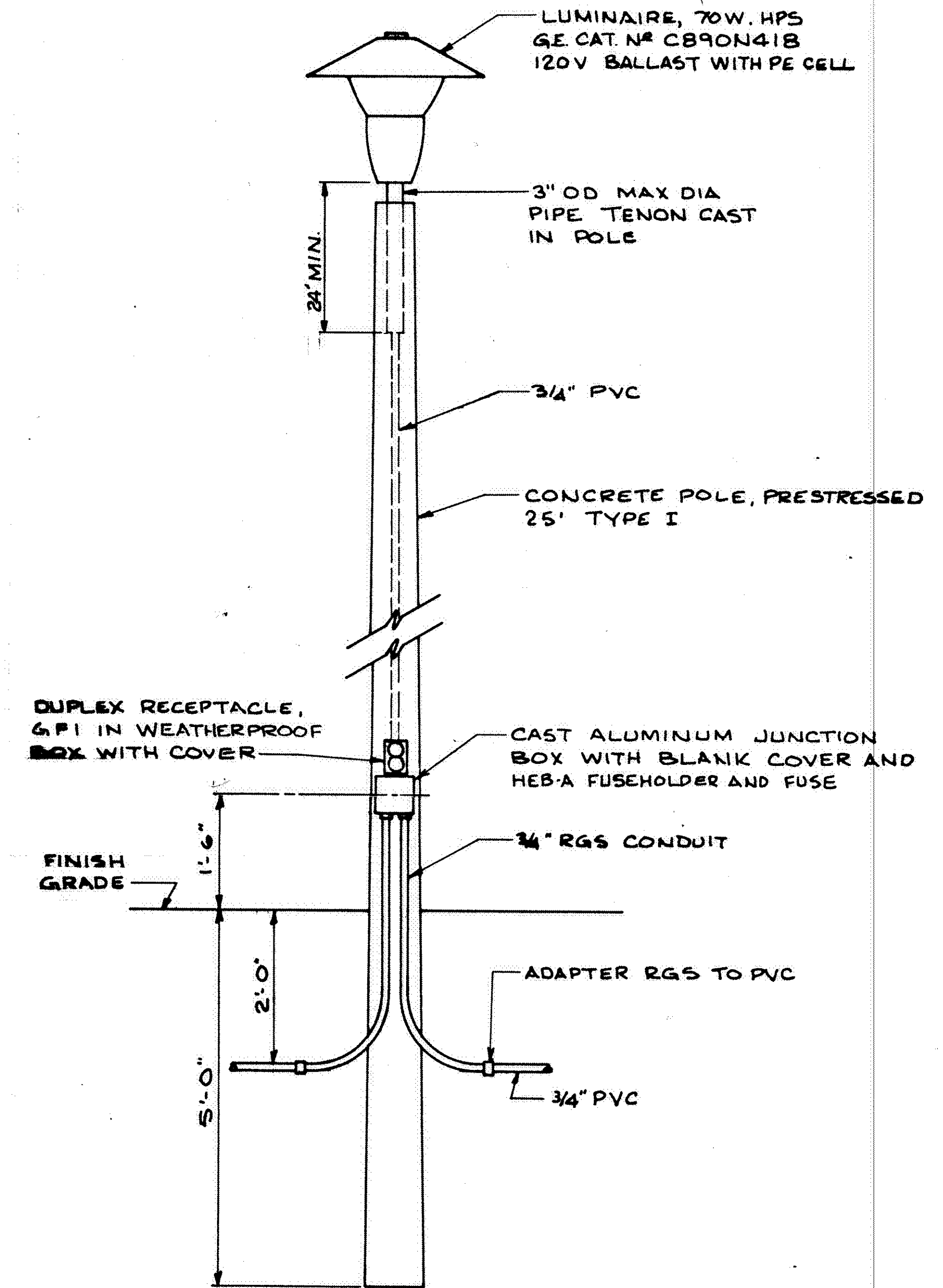


FIXTURE A - 2 LAMP DAMP LOCATION FLUORESCENT, WITH ABS CONSTRUCTION LITHONIA DL240A.

FIXTURE B - WALL MOUNT 50 WATTS HIGH PRESSURE HP SODIUM, W/ PE CELL. HUBBELL NRS-121-PC.



ELEVATION MOTOR CONTROL CENTER
SCALE: 1"=1'-0"



DETAIL YARD LIGHTING FIXTURE
SCALE: 3/4"=1'-0"

ON EAST PLANT USE 2 1/2" RGS FOR POLE ON PUMP STRUCTURE

Issued For
Informational Purposes

RECORD DRAWING

REV	DATE	BY	DESCRIPTION
1	5/28/05	ALG	RECORD DRAWING

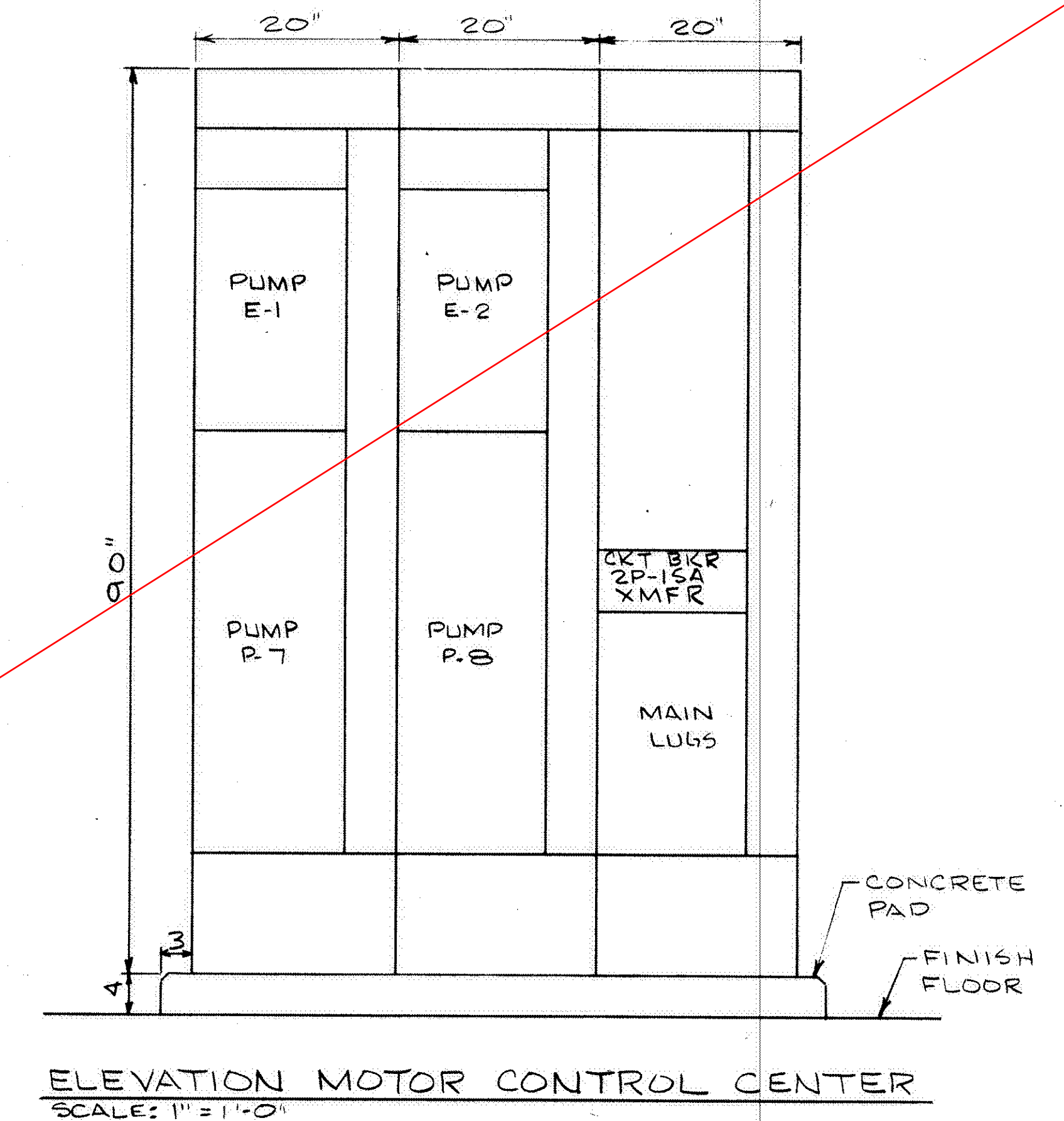
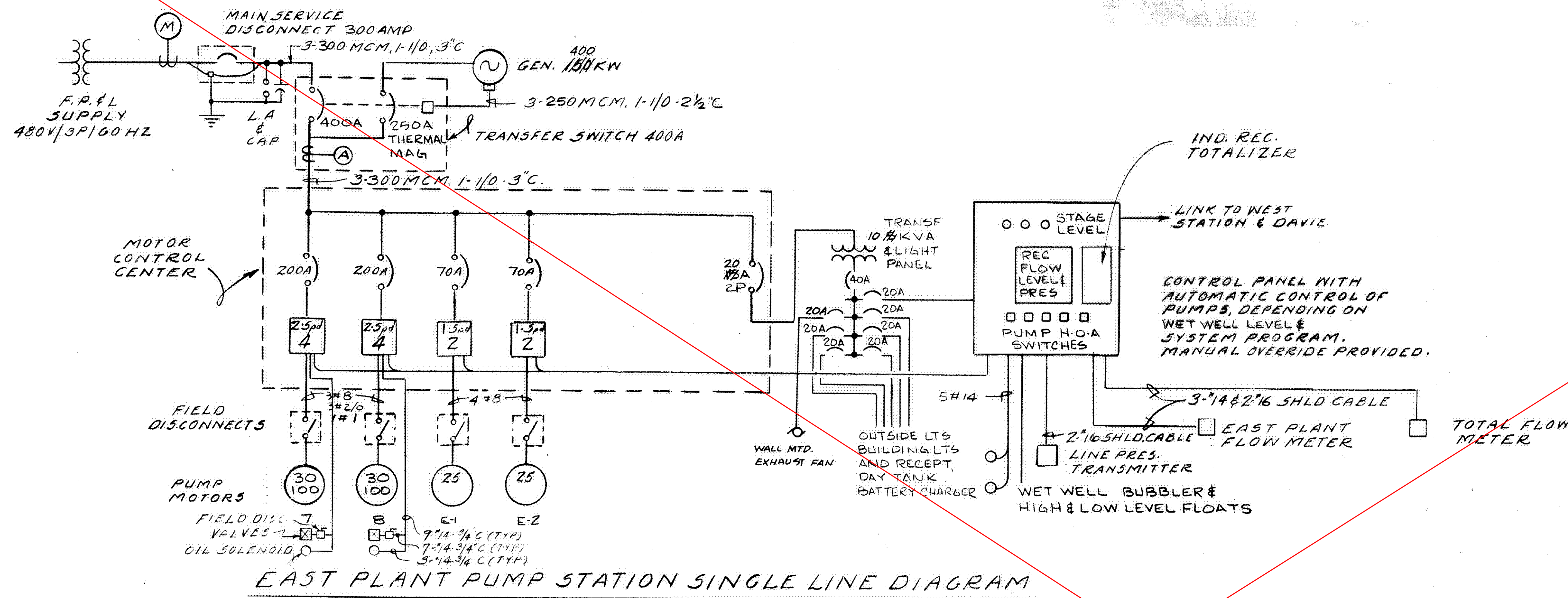
SCALE:	AS NOTED
DESIGNED:	ENP
DRAWN:	DPR
CHECKED:	ENP

SUBMITTED:	3/8/05	9-4-05
PROJECT ENGINEER:	31849	R.C.E. NO.
RECOMMENDED:	12/4/05	DATE

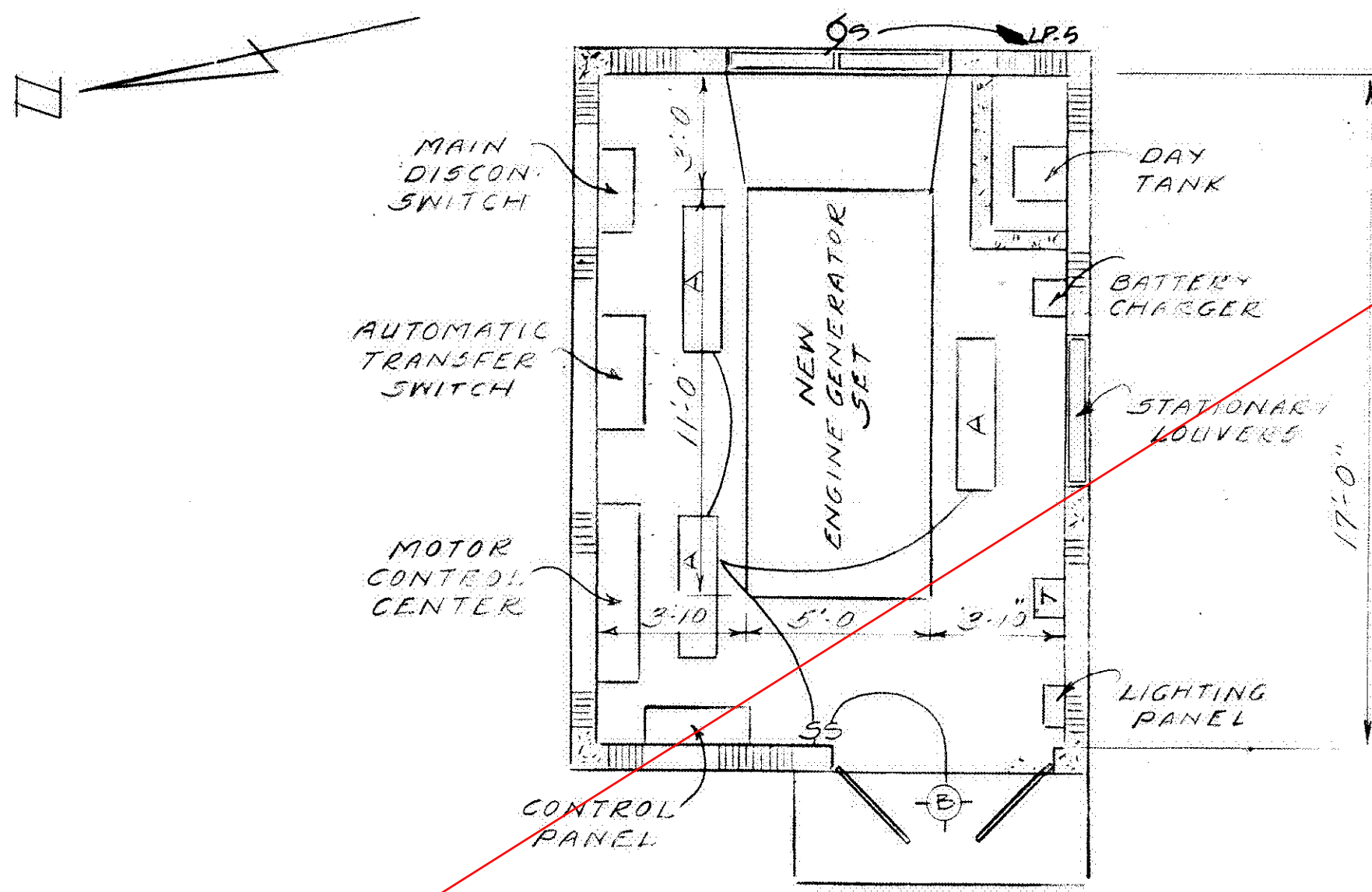
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.
5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313



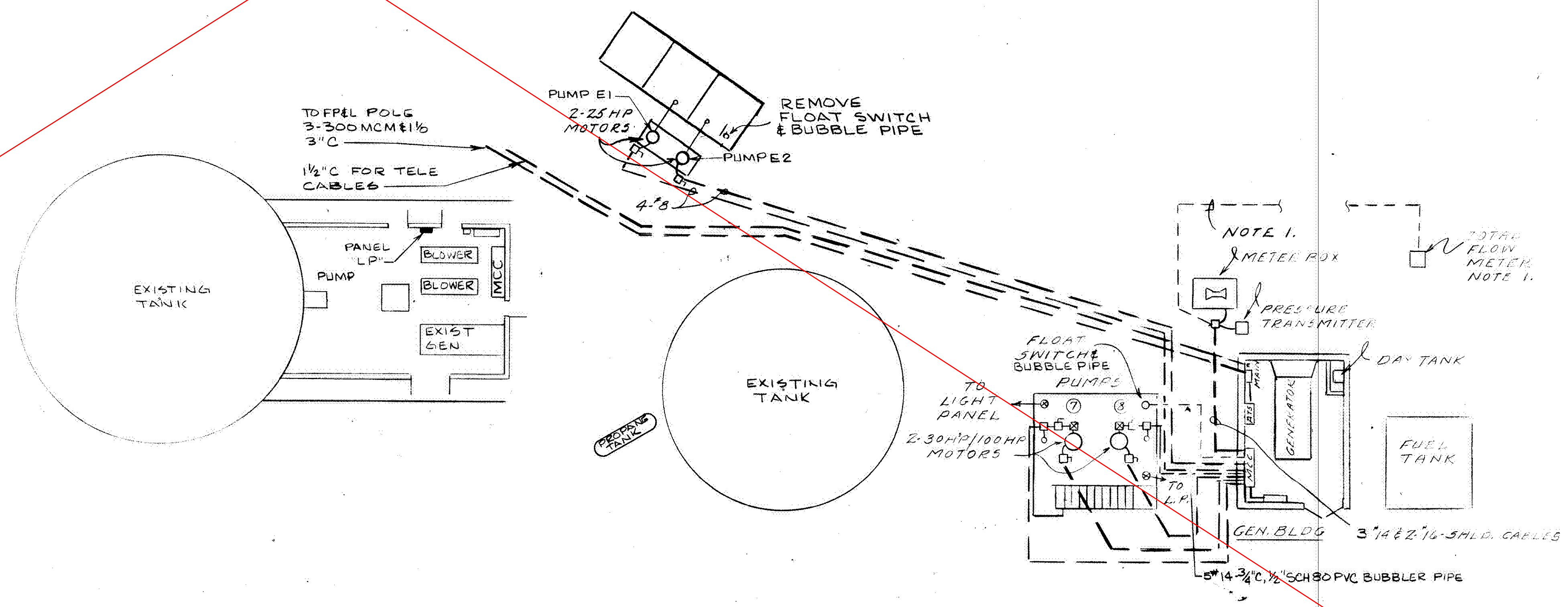
TOWN OF DAVIE AND COOPER CITY, FLORIDA
COOPER CITY PUMP STATIONS
WEST PLANT PUMP STATION
GENERATOR & CONTROL BLDG. ELECTRICAL PLAN



NOTE:
TOTAL FLOW METER TO BE INSTALLED AND WIRED UNDER ANOTHER CONTRACT (FORCE MAIN CONTRACT) WIRING TO STOP AT PLANT FLOW METER FINISH WIRING AND CONNECT TO PANEL UNDER THIS CONTRACT.

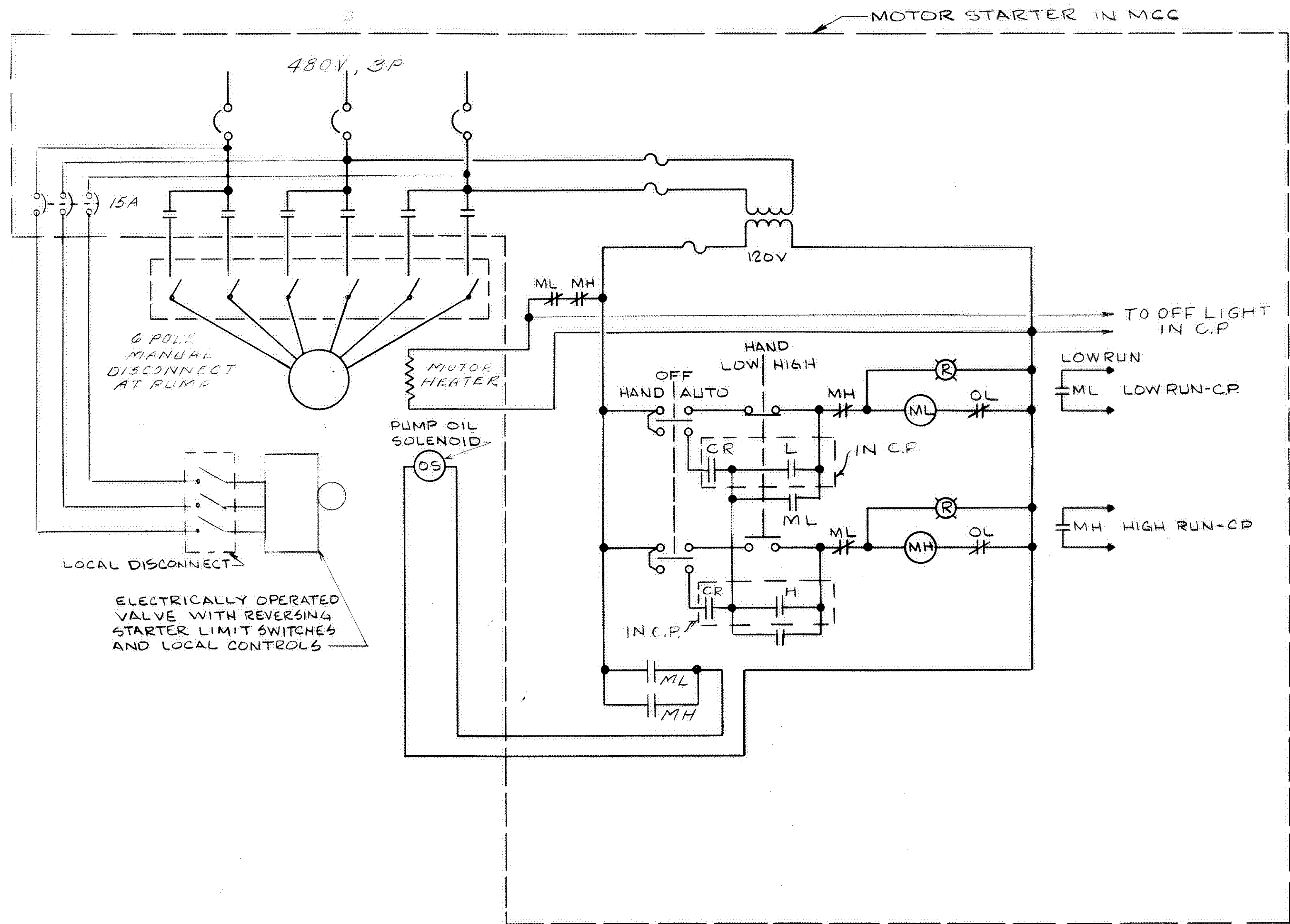


Issued For Informational Purposes



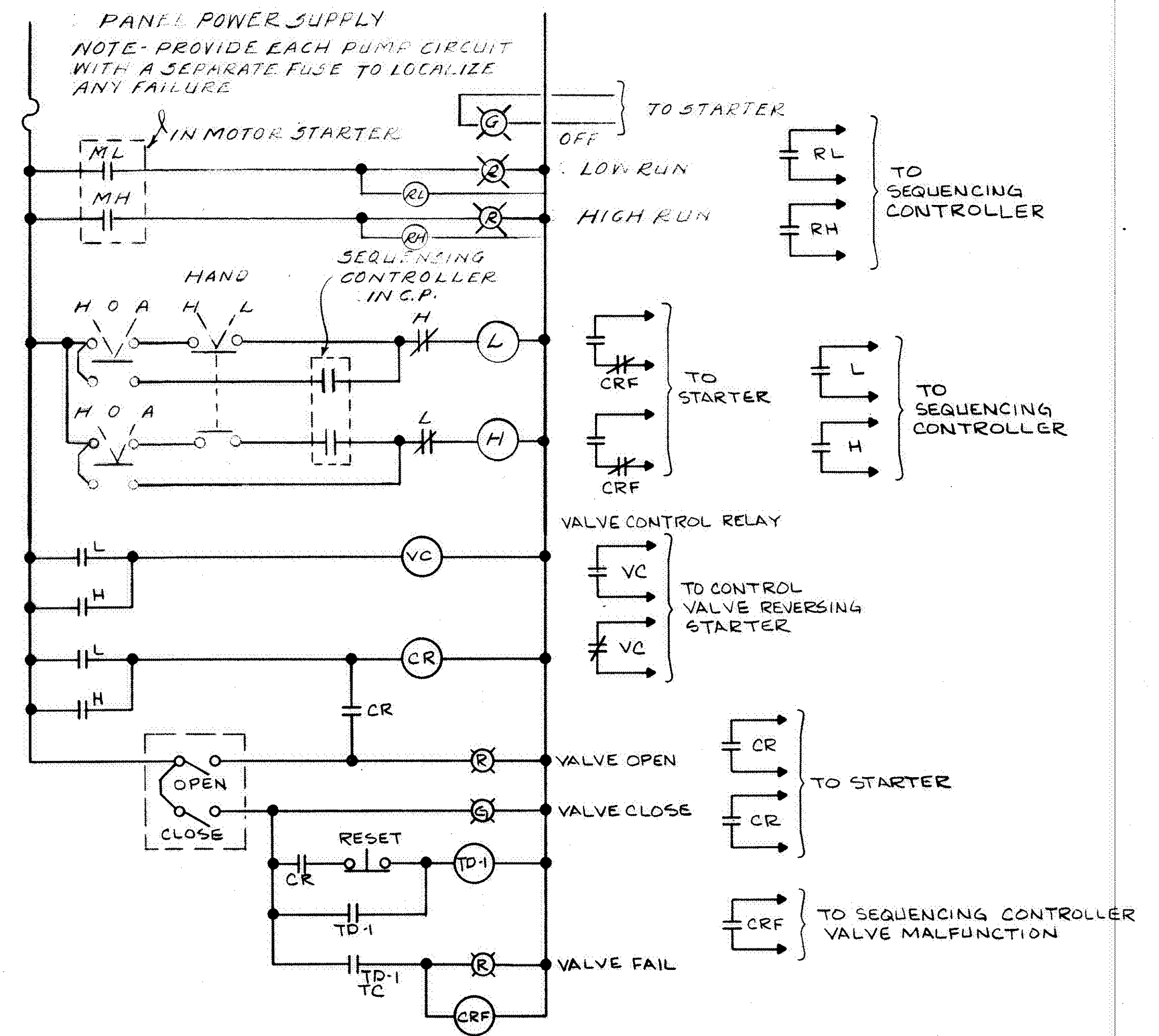
RECORD DRAWING

SCALE: 1" = 20' DESIGNED: ENP DRAWN: WAR CHECKED: ENP		SUBMITTED: 3/8/89 9-4-85 PROJECT ENGINEER: [Signature] REVISIONS: 17/4/ 9/4/85		JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. 5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313		TOWN OF DAVIE AND COOPER CITY, FLORIDA COOPER CITY PUMP STATIONS EAST PLANT PUMP STATION ELECTRICAL PLAN		SHEET 14 OF 16 SHEETS
--	--	--	--	--	--	---	--	------------------------------------



TYPICAL SCHEMATIC 2 SPEED PUMP

NOTE: SINGLE SPEED PUMPS HAVE SIMILAR SCHEMATIC EXCEPT E1 AND E2 AT EAST PLANT DO NOT HAVE ELECTRIC VALVES OR OIL SOLENOIDS

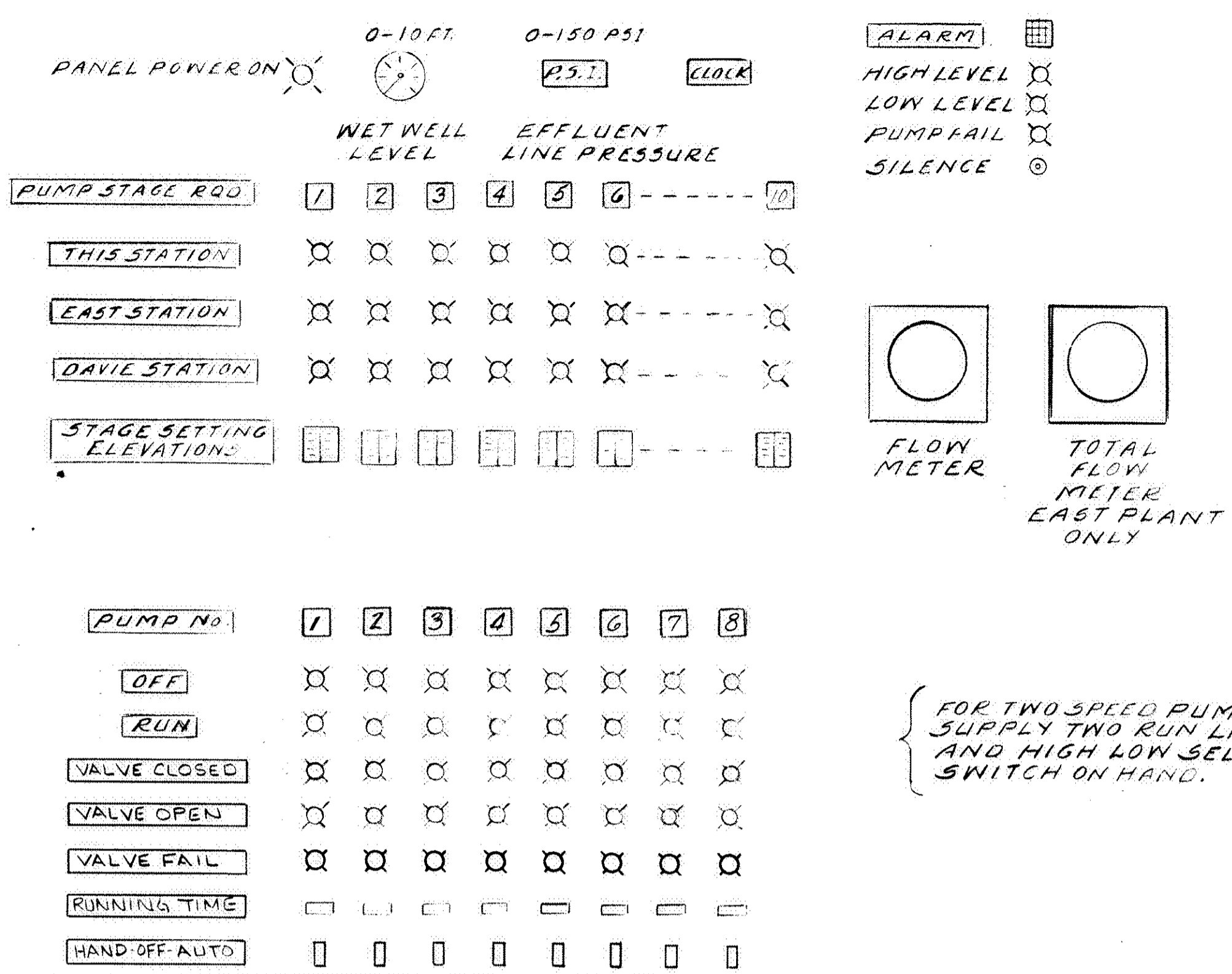


**TYPICAL PUMP CONTROL CIRCUIT
LOCATED IN CONTROL PANEL
(2 SPEED PUMP SHOWN)**

Issued For
Informational Purposes

RECORD DRAWING

JOB NO. PAS 20232 4 13 CC FILE	SCALE: N.T.S. DESIGNED: ENP DRAWN: WAR CHECKED: EWP	SUBMITTED: <i>Ben H. Chen</i> 3/8/49 9-4-85 PROJECT ENGINEER RECOMMENDED: <i>Blanche H. Hargis</i> 12/41 3/4/85 DATE	JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. <small>5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313</small>	TOWN OF DAVIE AND COOPER CITY, FLORIDA COOPER CITY PUMP STATIONS EAST & WEST PLANT PUMP STATIONS ELECTRICAL SCHEMATICS	SHEET 15 OF 16 SHEETS
1 5/20/85 A.L.S. RECORD DRAWING REV DATE BY DESCRIPTION					



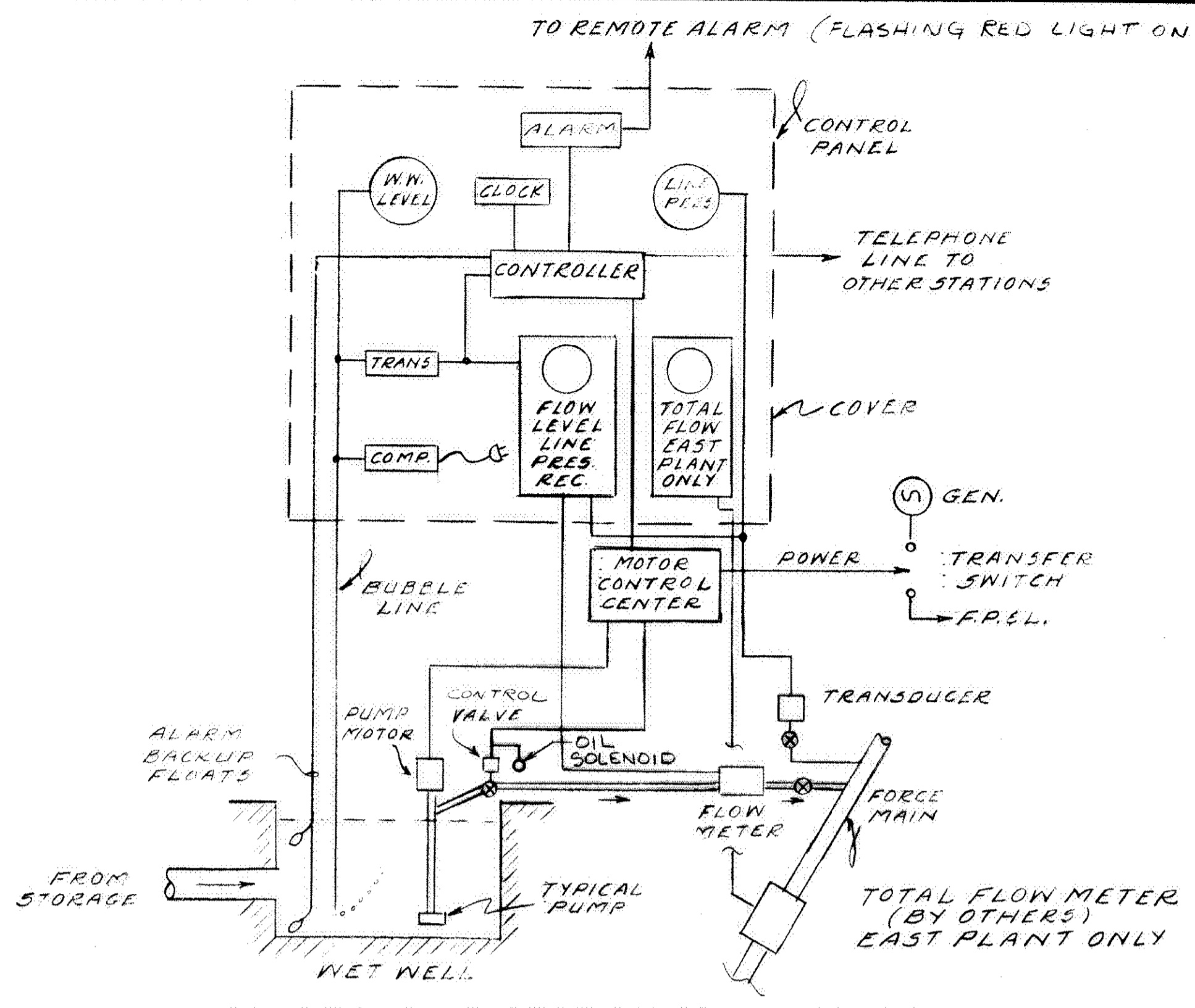
- ① PUMPING SEQUENCE SELECTION IS BY CONTROLLER. PUT OUT OF SERVICE PUMPS IN OFF POSITION OTHERWISE, ALARM WILL SOUND WHEN THEY ARE CALLED
- ② PUMP FAIL - INDICATES PUMP IS REQUIRED BY CONTROL, SELECTOR SWITCH IS IN AUTO, BUT PUMP IS NOT RUNNING OR VALVE IS NOT OPEN.
- ③ USE HAND POSITION ONLY IN EMERGENCIES AND INFORM OTHER PUMP STATIONS.
- ④ PUMP SEQUENCE IS AS FOLLOWS -
 STAGE 1 - PUMPS 1 AND 2 ALTERNATE
 STAGE 2
 STAGE 3

NOTE - EACH STAGE OF PUMP SEQUENCE TO BE ON SEPARATE NAME PLATE FOR EASY REPLACEMENT

FRONT VIEW OF CONTROL PANEL COMPONENTS
COOPER CITY WEST

FOR TWO SPEED PUMPS, SUPPLY TWO RUN LIGHTS AND HIGH LOW SELECTOR SWITCH ON HAND.

LAMECOID NAME PLATES



SCHEMATIC OF STATION COMPONENTS

NOTE - SEE SPECIFICATION FOR FURTHER DETAILS OF PUMP CONTROL.

Issued For Informational Purposes

RECORD DRAWING

SCALE: N.T.S.		DESIGNED: E.N.P.	SUBMITTED: 3/8/89 9-4-85	JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. <small>5975 WEST SUNRISE BOULEVARD, FORT LAUDERDALE, FLORIDA 33313</small>	TOWN OF DAVIE AND COOPER CITY, FLORIDA COOPER CITY PUMP STATIONS EAST & WEST PLANT PUMP STATIONS CONTROL PANEL	SHEET 16
DRAWN: W.A.R.		PROJECT ENGINEER: <i>Ben J. Chew</i>	RCE NO. DATE			OF 16 SHEETS
CHECKED: E.N.P.		RECOMMENDED: <i>Henry 17141</i>	RCE NO. DATE			

SECTION 26 29 23
LOW VOLTAGE VARIABLE FREQUENCY MOTOR CONTROLLERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, connect, test and place in satisfactory operating condition all variable frequency drives (VFDs) as specified herein and indicated on the Drawings.
- B. Reference the following Specification Sections:
 - 1. Section 26 05 00 – Basic Electrical Requirements
 - 2. Section 26 05 53 – Identification for Electrical Systems
 - 3. Section 26 43 13 – Surge Protective Devices
 - 4. Section 26 29 13.16 – Low-Voltage Enclosed Motor Controllers-Reduced Voltage
 - 5. Section 26 09 16 – Electric Controls and Relays
- C. The Contractor is responsible for coordinating with the driven equipment manufacturer and the VFD manufacturer to ensure that the VFD is sized properly to meet all the requirements herein. This includes, but is not limited to, accounting for motor RPM and variable or constant torque applications. The Contractor is responsible for including any costs related to equipment upsizing, conduit, and wire upsizing, etc. that results from selecting equipment with a higher full load amp rating than was specified or used as the basis for design.
- D. The variable frequency drives shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.

1.02 CODES AND STANDARDS

- A. VFDs shall be designed, manufactured, and/or listed to the following standards as applicable:
 - 1. NEMA 250 – Enclosure for Electrical Equipment
 - 2. IEEE 519 – Recommended Practice and Requirements for Harmonic Control in Electric Power Systems

3. NEMA ICS 7 – Adjustable-Speed Drives
4. NEMA ICS 61800-2 – Rating Specifications for Low Voltage Adjustable Frequency AC Power Drive Systems
5. UL 489 – Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures
6. UL 508A – Standard for Industrial Control Panels
7. UL 508C – Standard for Power Conversion Equipment

1.03 DEFINITIONS

- A. The following definitions are provided for clarity regarding the language used in this Specification:
 1. Variable Frequency Drive (VFD) – The complete custom-engineered VFD as packaged within an overall enclosure, including the VFD unit and all other components within that enclosure as specified herein.
 2. VFD Unit – The solid-state power electronic device or devices within the VFD.

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in General Conditions and Section 01 30 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 1. Shop Drawings
 2. Operation and Maintenance Manuals
 3. Spare Parts List
 4. Reports of Certified Shop and Field Tests
 5. Manufacturer's Field Start-up Report
 6. Manufacturer's Representative's Installation Certification

1.05 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings **for each VFD** shall include but not be limited to:
1. A Compliance, Deviations, and Exceptions (CD&E) letter. If the shop drawings are submitted without this CD&E letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this Specification Section. In the left margin beside each paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.
 2. Complete bill of material and catalog data sheets for all equipment and devices comprising the VFD.
 3. Heat loss data for each VFD.
 4. Manufacturer's warranty information.
 5. Product data sheets for **all** system components, including but not limited to:
 - a. VFD units
 - b. Harmonic correction devices and/or equipment, e.g., line reactors, passive filters, and/or 18-pulse phase-shifting transformers
 - c. Output reactors and/or output filters if space adequate in or above drive.
 - d. Pilot lights and pilot devices
 - e. Control and timing relays
 - f. Enclosure fans
 - g. Contactors
 - h. Power supplies
 - i. Control power transformers

- j. Current transformers
 - k. Potential transformers
 - l. Circuit breakers and/or motor circuit protectors
 - m. Fuses
 - n. Terminal blocks (power, control, and shorting)
 - o. Surge protective devices
 - p. Voltage (phase) monitor
 - q. Integral PLC for controlling multiple control input signals
 - r. Integral circuitry to provide an alarm light and shut the pump down upon receiving a Pond Low Level signal from the float (LSL-153) driven backup system.
6. Layout drawings of the VFD that include:
- a. All cabinet or enclosure dimensions, access details, and weights.
 - b. Required clearances around the enclosure, e.g., ventilation.
 - c. Conduit entry areas and/or stub-up locations.
 - d. Nameplate sizes, colors, and locations.
 - e. Physical arrangement of door mounted devices located on the variable frequency drive enclosure.
 - f. Physical arrangement of all interior components, including DIN-rail-mounted devices.
- General "catalog data sheet" layout drawings which are not specific to the systems specified herein are not acceptable.
7. Custom schematic and interconnection wiring diagrams of all electrical work, including but not limited to, circuit breakers, motor circuit protectors, contactors, instrument transformers, meters, relays, timers, control devices, terminal blocks and identification numbers, wire numbers, required or recommended options and other equipment comprising the complete system.

- a. These drawings shall be circuit specific for effluent pumps motor-load combination. Specific equipment names consistent with the Drawings shall appear on each respective diagram.
- b. Indicate all devices, regardless of their physical location, on the schematic diagrams.
- c. Electrical ratings of all equipment and devices shall be clearly indicated on the schematic diagrams.

Standard schematics and wiring diagrams that are not custom created by the manufacturer for the variable frequency drives for this project are not acceptable.

8. Confirmation of spare parts requirements as specified herein.
 9. Table listing all motor loads connected to the VFD. Table shall include the full load amps of the APPROVED motors. Final approval of VFD shop drawings cannot be given until all motor loads for each VFD have been reviewed, approved, and shown in this table.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.06 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions, Section 01 30 00 – Submittal Procedures and Section 46 00 00 – Equipment General Provisions.
- B. Prior to completion and final acceptance of the project, the Contractor shall furnish and install "as-built" wiring diagrams for each VFD. These final drawings shall be included in the O&M manuals and an additional copy that is plastic laminated shall be securely placed inside each VFD.
- C. The O&M manual shall include the "as-commissioned" parameters of each VFD in both print and digital formats.
- D. If the VFDs require computer software or configuration, the O&M manual shall include copies of all programming guides/manuals.

1.07 SPARE PARTS

- A. The VFDs and accessories shall be furnished with all spare parts as recommended by the equipment manufacturer. In addition to the manufacturer recommended spare parts, the Contractor shall furnish the following spare parts:
 - 1. Two (2) sets of fuses for each size and type of fuse provided.
 - 2. A spare HMI shall be provided for each HMI provided for control. If one HMI can serve as communication devices for both the VFD and the PLC, then only one spare required.
 - a. One (1) VFD HMI.
 - b. One (1) PLC HMI.
 - 3. One (1) set of enclosure air filters for each VFD.
- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.
- D. Spare parts lists included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

- E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.08 WARRANTY

- A. The Contractor shall warrant that the material and workmanship of all components and the operation of the VFDs and auxiliary equipment is in accordance with the latest design practices and meets the requirements of this Specification.
- B. The warranty shall include, but not be limited to the following:
 - 1. Replace components found to be faulty and make changes in equipment arrangement or make adjustments necessary to meet the equipment or functional requirements or this Specification.
 - 2. System rewiring and component substitution/rebuild.
 - 3. All accessories and appurtenances provided by the VFD manufacturer.
- C. The warranty shall be in effect for a period of 24 months following final acceptance of each VFD.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be equipment of proven performance. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. The Contractor shall obtain the VFDs from one manufacturer who shall also manufacture and assemble the enclosure and major equipment components including, but not limited to the VFD unit. The manufacturer shall have five years minimum of experience in the manufacture of similar units and shall have a general distribution to the electrical trade.
Subcontracting of wiring and/or third-party assembly is not acceptable.
- C. The VFD shall be Yaskawa Model iQ1000 by ICON Technologies.
- D. The Contractor shall be responsible for the successful application and operation of the entire drive and control system serving the motor and driven equipment. This includes the responsibility for obtaining all load, torque, speed and performance requirements from the appropriate sources and integrating these into a VFD that fulfills the requirements of this Specification.

2.02 VFD SYSTEMS

A. Operating Conditions

1. The following operating conditions are applicable for all equipment of this Specification.
 - a. Humidity: 0-95%.
 - b. Ambient Temperature: 0 degrees Celsius to plus 40 degrees Celsius.
 - c. Altitude: up to 3,300 feet

B. Basic Design and Performance

1. Each VFD shall be a complete alternating current electric drive system including all hardware and software necessary to accomplish variable speed operation of a motor and load combination. VFDs shall be provided in accordance with the requirements indicated on the Drawings and as described in these Specifications.
2. Each VFD shall be suitable for operation as part of a 480 VAC, 3phase, 60 Hertz power distribution system. The complete VFD system shall have a minimum short circuit current rating of 35,000 amperes symmetrical at rated voltage.
3. **The Contractor** is fully responsible for the review of the full Contract Documents to determine specified motor speed, horsepower and full load ampere requirements for each motor-driven load. In addition, the Contractor shall size and select the VFD and components as follows:
 - a. Each VFD shall provide, continuously, motor load current equal to 100% of the direct on-line motor nameplate full load current.
 - b. Each VFD shall be selected for Variable Torque (Normal Duty) or Constant Torque (Heavy Duty) based on its respective load type served as shown in the Load Type tables below.

Variable Torque (Normal Duty) Load Types	Constant Torque (Heavy Duty) Load Types
Vertical Turbine Pumps OR [Not Included Under this Contract]	Rotary Lobe Pumps OR [Not Included Under this Contract]
Horizontal Non-Clog Pumps	Progressive Cavity Pumps
Horizontal Self-Priming Centrifugal Pumps	Horizontal Centrifugal Chopper Pumps
Submersible Non-Clog Pumps	Positive Displacement Blower Packages

Variable Torque (Normal Duty) Load Types	Constant Torque (Heavy Duty) Load Types
Vertical Non-Clog Pumps	Dewatered Sludge Screw Conveyors
Vertical Turbine Mixers	Screw Pumps
Submersible Propeller (Window) Pumps	

- c. The Load Type tables above are intended to exhaustively cover all possible equipment controlled by VFDs to be provided under Division 26 for this Contract. If a piece of equipment is found that is not explicitly listed in these tables, this discrepancy shall be brought to the attention of the Engineer (in writing) immediately for resolution **prior to submitting the Bid for this Contract.**
4. Each VFD shall be suitable to operate, at times, on a limited power source engine-generator set. The VFD shall be provided with equipment and devices to prevent waveform distortion as specified herein.
5. Each VFD shall be provided with control and sequence logic as specified herein and indicated on the Drawings. Control and sequence logic shall be designed such that the motor-load combination can be operated in the manual mode upon control and sequence logic failure, including all necessary personnel and equipment safety interlocks. Each VFD shall be designed such that specific control and protection functions can be attained through simple programming by either factory engineers or Owner's trained operating personnel. In addition, refer to Contract Drawings for process control descriptions, for a description of the operation of each VFD.
6. Unless otherwise accepted in writing by the Engineer, VFDs shall be provided with output reactors or filters to prevent elevated voltage levels at the motor terminals that exceed the ratings of the inverter duty rated motor winding insulation.
- a. **The Contractor** is responsible for providing the VFD manufacturer with estimated and field-verified cable lengths between each VFD and its respective motor. The VFD manufacturer shall select and size the output reactors or filters based on the cable lengths provided by the Contractor. Any change in output filter or reactor selection and/or size from the Bid shall be immediately brought to the attention of the Engineer in writing for resolution.
- b. The output filters or reactors shall be manufactured by TCI, MTE Corporation, Mirus International, or engineer approved equal.

7. Motor control circuits shall be wired in accordance with the requirements specified herein and/or indicated on the Drawings.

C. Components

1. Each VFD shall contain the number of auxiliary contacts, control power transformer(s), pilot devices and indicating lights, control relays, elapsed time meters, and other devices as specified herein, shown on the Drawings and required for the applications. The following components shall meet the requirements of Section 26 09 16 – Electrical Controls and Relays:
 - a. Pilot devices (switches, indicating lights, etc.)
 - b. Relays and timers
 - c. Terminal blocks
2. Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
3. Electrical bus, including ground bus, shall be tin-plated copper. Power and control wiring shall be copper, color coded and identified in accordance with these Specifications.
4. Each VFD shall be of modular construction allowing normal maintenance and repair to be done with ordinary hand tools. Design and install power electronic component assemblies so that, where practicable, components can be individually removed and replaced.
5. Auxiliaries, including fans, that are required for rated load operation at maximum ambient temperature, shall be 100% redundant. New and unused spare replacement fan(s) or air conditioning unit(s), shipped in original carton, may be provided in lieu of 100% redundant auxiliaries if accepted in writing by the Engineer.
6. Circuit boards and electrical components shall meet the corrosion protection requirements specified in these Specifications. Varnished or epoxy encapsulated circuit boards and tropicalized contactors suitable for corrosive environments shall be furnished.
7. Circuit Breakers
 - a. The VFD shall be protected by a UL 489 Listed circuit breaker.
 - b. Unless otherwise indicated, circuit breakers shall be manually operable and shall provide thermal-magnetic, inverse-time-limit overload, and instantaneous short-circuit protection.

- c. Circuit breakers shall be molded case type, rated 480 Vac, 3 pole and have 100 ampere or larger frames. The interrupting rating shall match that of the VFD short circuit rating at 480V.
 - d. Overload protection shall be provided on all poles with trip settings as indicated on the Drawings. Breakers of 225-ampere frames and larger shall have interchangeable trip units.
 - e. Where indicated on the Drawings, shunt trip devices shall be provided to trip a circuit from a remote location by means of a trip coil energized from a separate circuit. A 120V shunt trip shall be capable of operating at 55% or more of rated voltage. All other shunt trips shall be capable of operating at 75% or more of rated voltage.
8. VFD shall be provided with surge protective devices that meet the requirements of Section 26 43 13 – Surge Protection Devices or that the manufactures integral surge protection matches or exceeds the requirements in Section 26 43 13.

D. Controls

- 1. Each VFD shall be provided with automatic and manual controls as shown on the Drawings and as required to comply with all Specifications. Controls and indicators to accomplish operation and maintenance shall be located on the variable frequency drive equipment assembly as specified herein and indicated on the Drawings.
- 2. The Elementary Control Schematics **if** shown on the Drawings are **representative of design intent only**. The manufacturer shall be responsible for providing all additional components, controls, and internal wiring necessary to meet the design intent.
- 3. VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable. Fans that are used exclusively to provide cooling for the VFD unit (and not the overall enclosure) are permitted to run continuously if required by the VFD manufacturer's design standards/practices.
- 4. The VFD shall include circuitry and functionality to indicate a low pond level and shut down pump No.3 upon receiving a "Pond Low Level" signal (dry contacts) from the pond low level switch.
- 5. Motors shown, on the drawings, with an auxiliary cooling fan shall be controlled from the VFD. Fan motor voltage shall be 120V, 1PH. A separate circuit will be provided from the existing lighting panel to the VFD to power the pump motor

auxiliary fan. The auxiliary fan motor shall be controlled to run when the pump motor is running.

E. Enclosures

1. Due to space constraints, the VFD enclosure shall not be larger than the dimensions shown on the electrical drawings.
2. Equipment within the VFD enclosure shall be arranged so that it does not interfere with the entry of conduits and cables into the enclosure.
3. All pilot devices (selector switches, pushbuttons, indicating lights, etc.) and the human machine interface (HMI, specified elsewhere herein) shall be door mounted on the exterior of each VFD enclosure. Manipulation of the pilot devices or HMI, viewing of the information on the HMI, or viewing that status of pilot devices shall not require the VFD enclosure door to be opened.
4. Unless otherwise indicated on the Drawings, VFDs in non-hazardous locations, shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Painted Steel
Indoor Dry Non-Process Area	NEMA 1, Painted Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

5. VFDs shall not be installed in hazardous locations.
6. NEMA 1 and NEMA 12 VFD enclosures shall be force ventilated with front accessibility and the following:
 - a. Enclosures shall be provided with washable enclosure air intake filters that can be replaced while the enclosure door remains closed.
 - b. Enclosures shall be designed for bottom or top entry of conduits and cables as required.
 - c. Enclosures shall be finished in ANSI-61 gray enamel or in a color to match the complete line-up of equipment as indicated on the Drawings and accepted by the Engineer.

7. NEMA 4X VFD enclosures shall be air conditioned, dead-front, with front accessibility and the following:
 - a. The air conditioning system shall utilize a heat-exchange method that allows for cooling of the enclosure interior without circulating outside air through the enclosure.
 - b. VFDs shall be furnished with an additional control power transformer sized to provide power exclusively for the air conditioning system and enclosure space heater.
 - c. VFDs shall be designed for top or side entry of cables/conduits.
8. Each VFD shall be designed such that rear access to the enclosure is not required for operations, maintenance, or repair tasks.
9. The Contractor shall reference the Drawings for maximum dimensions of the VFDs. No exceptions to the dimensions indicated on the Drawings will be permitted. The Engineer shall be notified prior to the initial shop drawing submittal if exceptions to the dimensions indicated on the Drawings are to be requested.
10. Integrating VFDs into a motor control center assembly is not permitted unless specifically shown as integrated on the Drawings.
11. Each VFD enclosure shall be supplied with an industrial, heavy-duty flange-mount handle mechanism for the operation of the VFDs disconnecting means as follows:
 - a. The mechanism shall be engaged with the disconnect device at all times as an integral part of the unit regardless of the unit door position.
 - b. The operator handle shall have an up-down motion with the down position as off. The ON-OFF condition of the disconnecting means shall be permanently marked on the handle operator.
 - c. It shall be possible to lock the handle in the "OFF" position with up to three (3) 3/8-inch diameter shackle padlocks and in the "ON" position with one (1) 3/8-inch diameter shackle padlock.
 - d. The operator handle shall be mechanically interlocked such that the disconnecting means cannot be closed with the enclosure door open, nor can the enclosure door be opened when the disconnecting means is closed. A def eater mechanism shall be provided so that qualified personnel can bypass these interlocks for maintenance and testing purposes. The def eater mechanism shall allow the enclosure door to be opened without interrupting the operation of the VFD.

F. Nameplates and Legend Plates

1. Provide engraved plastic nameplates and legend plates to identify each VFD and associated door mounted devices and internal components. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.
2. Equipment names and/or numbers and device identification text shown on the Drawings shall be used as the basis to engrave the nameplates and legend plates. Where the equipment identification text would exceed the capacity of the VFD manufacturer's standard nameplate/legend plate size, the manufacturer shall provide larger nameplates and/or additional nameplates as necessary. Abbreviating equipment names/numbers and device identification text is not acceptable.
3. Control components mounted as part of the assembly, such as fuse blocks, control relays, pushbuttons, switches, and similar devices, shall be suitably marked with identification corresponding to appropriate designations on the manufacturer's wiring diagrams.

2.03 VFD UNITS

- A. The VFD unit shall be the Yaskawa model iQ with options indicated on the Contract drawings.
- B. Basic Design and Performance
 1. Each VFD unit shall be of adjustable frequency, adjustable voltage, pulse width modulated (PWM) design. The units shall be microprocessor controlled, fully digitally programmable, and capable of precise and repeatable speed regulation of three phase 480 VAC NEMA Design A or B induction motors. Units for other than NEMA Design A or B induction motors (e.g., NEMA Design C) shall be coordinated with the requirements of that respective load.
 2. Each VFD unit shall consist of a semiconductor rectifier system, direct current link, and pulse width modulated inverter. The inverter shall invert the direct current voltage into an alternating current voltage at a frequency which shall be proportional to the desired speed. This alternating current voltage and frequency shall both vary simultaneously at a constant "Volts-Per-Hertz" ratio to operate the motor at the desired speed.
 3. Each VFD unit shall operate the motor and produce full rated nameplate horsepower at the motor output shaft without exceeding motor nameplate full load current and with the motor not exceeding rated total temperature not including the additional temperature increment that constitutes the motor service factor. Motor shall retain its service factor when operated by the variable frequency drive.

4. The overall efficiency of each VFD unit shall be a minimum of 95% when operating the specified motor-load combination at rated voltage, frequency, and current.
5. Each VFD unit shall provide smooth, stepless changes in motor speed and acceleration over the entire operating speed range from minimum to maximum speed. The VFD unit shall be provided with adjustable maximum and minimum frequency limits.
6. Each VFD unit shall maintain a desired output frequency (setpoint) with a steady state accuracy of 0.5% of rated frequency of 60 Hertz for a 24-hour period and a repeatability of 0.1% of rated frequency of 60 Hertz.
7. Each VFD unit shall be capable of operating the specified load continuously at any speed within the operating speed range of 10% to 100% of rated speed. The minimum and maximum continuous operating speeds shall each be adjustable within this speed range. The variable frequency drive shall provide for field adjustment of these setpoints.
8. Each VFD unit shall be capable of controlled linear acceleration and deceleration. Each VFD unit shall be capable of ramping the speed of the motor-load combination from the minimum selected operating speed to the maximum selected operating speed in a minimum of 30 seconds. Each VFD unit shall have two (2) field-adjustable speed setpoints for the variable frequency drive to skip equipment resonant frequencies. The acceleration and deceleration time limits shall be field adjustable to values up to 120 seconds.
9. Voltage or current unbalance between phases of the VFD unit output voltage shall not exceed 3% of the instantaneous values. The VFD unit shall continuously monitor the output voltages and generate an alarm condition when the unbalance exceeds 3%. The system shall detect and generate a separate alarm for loss of any output phase voltage (single phasing). Phase unbalance shall be as defined by NEMA Standard MG-1.
10. Each VFD unit shall operate continuously without interruption of service or damage to equipment during transient input voltage variations of plus or minus 10% for a duration of 15 cycles. VFD unit output voltage regulation shall be plus or minus 2%.

C. Features and Characteristics

1. Each VFD unit shall be furnished with a Human Machine Interface (HMI) to provide controls and indication to accomplish maintenance and operational functions as specified herein and shown on the Drawings. The HMI shall be password protected after startup to prevent unauthorized personnel from making changes. The HMI shall at minimum provide indication of the following:

- a. Input Voltage
 - b. Output Voltage
 - c. Output Current
 - d. Output Frequency
 - e. Output Speed from 0-100%
 - f. Alarm Read-out
2. Each VFD unit shall provide a 4-20 mADC output signal that is proportional to the drive output frequency for use as speed feedback/speed indication to external equipment.
 3. Each VFD unit shall accept a 4-20 mADC speed input command signal to control the output frequency in the automatic and/or manual control modes as specified herein or indicated on the Drawings. The system shall accept the input increase/decrease command with a resolution that permits incremental changes in speed equal to or less than 0.1% of rated speed.
 4. Where shown on the Drawings, VFD units shall also accept a 0-10VDC input from a speed potentiometer for manual speed control. The VFD unit shall be capable of selectively switching between the input speed command signals as shown on the Drawings.
 5. Each VFD unit shall be furnished with a PLC & Human Machine Interface (HMI) to provide controls and indication to accomplish operational functions as specified herein and shown on the Drawings. These include Flow, Level and Pressure control modes selectable by a plant operator.
 6. Input Voltage Loss Handling
 - a. The VFD unit shall shut down upon a loss of one or more input phases, a 3-phase complete input power loss, or a sustained input undervoltage event. A sustained input undervoltage event is defined as voltage that is less 75% of nominal, for more than 0.5 seconds.
 - b. Upon restoration of 3-phase power that is at an acceptable voltage level, the VFD unit shall automatically reset (after an adjustable time delay, 0-2 minutes) and be capable of being restarted and ramping up to speed when remotely commanded through the control system or locally commanded at any local controls. Personnel shall not be required to reset the VFD unit manually after a shutdown caused by any input voltage loss event.

- c. Automatic reset of the VFD unit shall be achieved through programming/parameter setpoints, time delay relays, or a combination of both.
7. Each VFD unit shall have a multiple attempt restart feature.
8. Each VFD unit shall have an automatic current limit feature to control motor currents during startup and provide a "soft start" torque profile for the motor-load combination. The VFD unit shall also limit current due to motor winding or motor lead phase-to-phase short circuit or phase-to-ground short circuit. The current limit protection setting shall be field adjustable.
9. Each VFD unit shall be furnished with programmable electronic overload and torque limits.
10. Each VFD unit shall have an automatic trip feature which will remove the drive output from the motor and allow it to decelerate safely. This automatic system shall lock-out the VFD unit and indicate the fault only upon the following conditions:
 - a. Output voltage unbalance (trip threshold field set).
 - b. Loss of phase on output.
 - c. Motor overload.
 - d. Motor stator winding fault (phase-to-ground, phase-to-phase).
 - e. Unacceptable voltage variation.
 - f. High variable frequency drive equipment temperature.
 - g. VFD failure as determined by the manufacturer.
 - h. Component failure.
 - i. Overcurrent.
11. Provide each VFD unit with protection against starting a rotating motor, both directions (coasting to zero speed and backspin). In the event that a motor automatic restart feature (catch the motor "on-the-fly") is provided in the VFD unit, this feature shall be capable of being disabled.
12. Each VFD unit shall include on-line diagnostics, with an automatic self-check feature that will detect a variable frequency drive failure.
 - a. Diagnostics shall operate a visual alarm indicator on the HMI.

- b. Diagnostics shall provide an easily readable output that can be used to isolate a failure.
 - c. Provide last ten specific fault(s) and the sequence in which the faults occurred. An indication of the "First Out" failure is a minimum for fault sequence detection.
 - d. Provide normally open and/or normally closed dry contacts as indicated on the Drawings for VFD failure conditions .
13. The VFD unit shall communicate the following parameters to the VFD internal control system PLC via Ethernet/IP protocol. Provide any necessary hardware gateways to provide this communication capability. The following parameters, at a minimum, shall be communicated:
- a. Motor current (all phases)
 - b. Motor voltage (all phases)
 - c. Motor KW
14. Where indicated on the Drawings, provide input cards that allow connection of speed encoders to the VFD unit.
15. Each VFD unit shall be provided with input/output (I/O) cards including expansion cards as necessary to facilitate connection of all I/O specified herein and shown on the Drawings.

2.04 HARMONIC CORRECTION

- A. Harmonic correction devices for each VFD shall be as specified herein and located as shown on the Drawings.
- B. Input Line Reactors
 - 1. 6-pulse VFD units shall be provided with input line reactor and/or integral DC link reactor. Total reactor impedance shall be a minimum of 3% and shall not exceed 5%.
- C. Passive Filters
 - 1. Where indicated on the Drawings or where additional harmonic correction is required, 6-pulse VFD units shall be provided with a passive harmonic filter in addition to the integral DC link reactor specified above (if present.)

2. Passive harmonic filters shall be sized to attenuate harmonics resulting from operation of the VFD-driven motor load to no more than 5% THID when operating at full load, and no more than 8% THID when operating at 30% of full load. The filter shall be equipped with power contactors configured to remove the capacitors from the circuit when the VFD-driven loads are not in operation. The harmonic filters shall be as manufactured by TCI, MTE Corporation, Mirus International, or Engineer approved equal.
3. Passive filters shall be integrated into the VFD unless accepted in writing by the Engineer or shown as separately mounted from the VFD on the Drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The VFDs shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.
- B. Install VFDs to allow complete door swing required for component removal.

3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Specification Section 01 xx xx. The following tests are required:
 1. Certified Shop Tests and Reports
 - a. Submit description of proposed testing methods, procedures, and apparatus.
 - b. Factory test the complete VFD in accordance with IEEE and NEMA standards.
 - c. Submit factory bench-test data to indicate that the manufacturer's proposed equipment has been tested in the specified arrangement and found to achieve specified accuracy.
 2. Field Tests
 - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA acceptance testing specifications referenced in Section 26 05 00 – Basic Electrical Requirements.
 - b. Harmonic distortion measurements shall be made after VFD installation. One set of measurements shall be made with the VFD loads inactive, and one set

of measurements shall be made with the VFD loads running at design capacity.

- B. Acceptance of a shop test does not relieve the Contractor from requirements to meet field installation tests under specified operating conditions, nor does the inspection relieve the Contractor of responsibilities.
- C. Certification on materials and records of shop tests necessary for the inspector to verify that the requirements of the Specifications are met, shall be made available to the inspector.
- D. Submit signed and dated certification that all the factory inspection and testing procedures described herein have been successfully performed by the Contractor prior to shipment.

3.03 SERVICES OF A MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall provide the services of a qualified manufacturer's factory-trained technical representative who shall adequately supervise the installation and startup of all equipment furnished under this Contract. The manufacturer's representative shall certify in writing that the equipment has been installed in accordance with the manufacturer's recommendations. No further testing or equipment startup may take place until this certification is accepted by the Owner.
- B. The manufacturer's technical representative shall perform all startup and field acceptance testing as specified herein.
- C. The Contractor shall provide training for the Owner's personnel. Training shall be conducted by the manufacturer's factory-trained representative who shall instruct Owner's personnel in operation and maintenance of all equipment provided under this Section. Training shall be provided for two (2) sessions of four (4) hours each. Training shall not take place until after the VFDs have been installed and tested. Training shall be conducted at times coordinated with the Owner.
- D. The services of the manufacturer's representative shall be provided for a period of not less than as follows:
 - 1. One (1) trip of one (1) working day during installation of the motor controllers.
 - 2. One (1) trip of one (1) working day to perform startup and field acceptance testing of the motor controllers.
 - 3. One (1) trip of one (1) working day to perform training as specified herein.

- E. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

3.04 PAINTING

- A. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same coating as used for factory finishing coats.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install conduits, conduit fittings, and appurtenances to complete the installation of all electrically operated equipment as specified herein, indicated on the Drawings, and as required.

1.02 CODES AND STANDARDS

- A. All equipment and materials shall be Listed by and shall bear the Label of Underwriter's Laboratories, Incorporated (UL).
- B. Conduits, conduit fittings, and appurtenances shall be designed, manufactured, and/or Listed to the following standards as applicable:
 - 1. American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE):
 - a. ANSI B1.20.1 – Pipe Threads, General Purpose.
 - b. ANSI C80.1 – Electrical Rigid Steel Conduit.
 - c. ANSI C80.3 – Steel Electrical Metallic Tubing.
 - d. ANSI C80.5 – Electrical Rigid Aluminum Conduit.
 - e. ANSI FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - 2. National Electrical Contractors Association (NECA):
 - a. NECA 1 – Standard for Good Workmanship in Electrical Construction.
 - 3. National Electrical Manufacturer's Association (NEMA):
 - a. NEMA FB 2.40 – Installation Guidelines for Expansion and Expansion/Deflection Fittings.
 - b. NEMA RN 1 – PVC Externally Coated Galvanized Rigid Steel Conduit.

- c. NEMA RV-3 – Application and Installation Guidelines for Flexible and Liquid-tight Flexible Metal and Nonmetallic Conduits.
 - d. NEMA TC-2 – Electrical PVC Conduit.
 - e. NEMA TC-3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.
4. National Fire Protection Association (NFPA):
- a. NFPA 70 – National Electrical Code (NEC).
5. Underwriters Laboratories (UL):
- a. UL 1 – Standard for Flexible Metal Conduit.
 - b. UL 6 – Electrical Rigid Metal Conduit-Steel.
 - c. UL 6A – Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel.
 - d. UL 360 – Standard for Liquid-tight Flexible Metal Conduit.
 - e. UL 467 – Grounding and Bonding Equipment.
 - f. UL 514B – Conduit, Tubing, and Cable Fittings.
 - g. UL 651 – Standard for Schedule 40 and 80 Conduit and Fittings.
 - h. UL 797 – Electrical Metallic Tubing-Steel.
 - i. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.
 - j. UL 1479 – Standard for Fire Tests of Penetration Fire Stops.
 - k. UL 1660 – Liquid-tight Flexible Nonmetallic Conduit.
6. Others:
- a. American Concrete Institute (ACI): ACI 318-19 – Building Code Requirements for Structural Concrete.
 - b. Aluminum Association – Aluminum and It's Alloys.

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:
 - 1. Shop Drawings
- B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
 - 1. Product data sheets for conduits and fittings.
 - 2. Conduit identification methods and materials.
 - 3. Evidence of training for all personnel that will install PVC coated rigid metal conduit.

1.05 DEFINITIONS

- A. Conduits are categorized by the circuit type of the wiring to be installed inside. Conduits are defined as follows:
 - 1. Power Conduits – Conduits that carry AC or DC power wiring from a source to a load. Conduits that carry lighting and receptacle wiring.
 - 2. Control Conduits – Conduits that carry AC or DC discrete control wiring between devices and/or equipment. Also, conduits that carry fiber optic cables between devices and/or equipment.
 - 3. Instrumentation Conduits – Conduits that carry AC or DC analog signal wiring between devices and/or equipment. Conduits that carry Category 5e or Category 6 unshielded twisted-pair cables.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Conduit and conduit fitting products are specified in the text that follows this article. Reference Part 3 herein for the application, uses, and installation requirements of these conduits and conduit fittings.
- B. All metallic conduit fittings shall be UL 514B and UL 467 Listed and constructed in accordance with ANSI FB 1. All metallic conduit fittings for use in Class I, Division 1 hazardous areas shall be UL 1203 Listed. All non-metallic fittings shall be UL 651 Listed and constructed in accordance with NEMA TC-3.
- C. Flexible conduit couplings for use in Class I, Division 1 hazardous areas shall have threaded stainless steel end fittings and a flexible braided core. Flexible braid shall be constructed of stainless steel where available in the conduit trade size required for the application. Where stainless steel braid is not available, the braid shall be provided with a PVC coating. No other braid types or materials are acceptable.
- D. Where threading is specified herein for conduit fitting connections, the fittings shall be manufactured to accept conduit that is threaded to ANSI B1.20.1 requirements.
- E. Conduit expansion fittings for all conduit materials of construction shall be capable of 4 inches of movement along the axis of the conduit for trade sizes 2 inches or less. Expansion fittings shall be capable of 8 inches of movement along the axis of the conduit for trade sizes greater than 2 inches.
- F. Conduit deflection fittings for all conduit materials of construction shall be provided with a flexible neoprene outer jacket that permits up to $\frac{3}{4}$ inch of expansion/contraction along the axis of the conduit as well as up to $\frac{3}{4}$ inch of parallel misalignment between the conduit axes. Outer jacket shall be secured to the conduit hubs by stainless steel clamps.
- G. Conduit seals shall either be Listed and Labeled for 40% fill, or conduit reducing fittings and a trade size larger conduit seal shall be provided to achieve 25% or less fill within the seal. Percentage fill calculation shall be based on the conductors to be installed. Conduit seals shall be provided with breathers and/or drains where required by the NEC.
- H. Conduit insulating bushings shall be constructed of plastic and shall have internal threading.
- I. Additional conduit and conduit fitting requirements are specified in the articles that follow based on the specific conduit material of construction to be used.

2.02 RIGID GALVANIZED STEEL (RGS) CONDUIT AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be hot dip galvanized on the inside and outside and made of heavy wall high strength ductile steel. Conduit shall be manufactured in accordance with ANSI C80.1 and shall be UL 6 Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.

B. Conduit Bodies for use with Rigid Galvanized Steel

1. Conduit bodies shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies for Class I, Division 1 hazardous areas shall be provided with integrally threaded covers constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish.
3. Conduit bodies for all other areas shall be provided with covers that are affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Covers shall be provided with matching gasket.

C. Conduit Couplings, Nipples, and Unions for use with Rigid Galvanized Steel

1. Couplings and nipples shall be threaded and shall be constructed of hot dipped galvanized steel. Split-type couplings that use compression to connect conduits are not acceptable.
2. Unions shall be threaded, rain-tight, and constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish.

D. Conduit Expansion and Deflection Fittings for use with Rigid Galvanized Steel

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of bronze or an electro-galvanized malleable iron alloy. Expansion and deflection fittings shall have threaded conduit connections.

2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

E. Conduit Seals for use with Rigid Galvanized Steel

1. Conduit seals shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Conduit seals shall have threaded conduit connections.

F. Conduit Termination Fittings for use with Rigid Galvanized Steel

1. Conduit hubs shall be constructed of stainless steel and shall have threaded connections to the conduit and enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.
2. Conduit locknuts shall be constructed of zinc plated steel. Locknuts shall have internal threading. Locknuts with integral gasket or seal are not acceptable. Locknuts shall have integral bonding screw where required for proper bonding.
3. Conduit bonding bushings shall be constructed of zinc plated malleable iron. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.03 RIGID NONMETALLIC CONDUIT AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be Schedule 40 or 80 (dependent on application) polyvinyl chloride (PVC) construction, manufactured in accordance with NEMA TC-2, UL 651 Listed, and suitable for conductors with 90 degree C insulation.

B. Conduit Bodies for use with Rigid Nonmetallic Conduit

1. Conduit bodies shall be constructed of PVC. Conduit hubs shall be integral to the conduit body and shall be smooth inside to accept a glued conduit connection.
2. Conduit body shall be provided with cover that is affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

C. Conduit Couplings and Unions for use with Rigid Nonmetallic Conduit

1. Conduit couplings and unions shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection.

D. Conduit Expansion and Deflection Fittings for use with Rigid Nonmetallic Conduit

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection.

E. Conduit Termination Fittings for use with Rigid Nonmetallic Conduit

1. Conduit hubs shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection. Hubs shall have external threads and an accompanying PVC locknut, and shall be watertight when assembled to an enclosure.
2. Conduit locknuts shall be constructed of zinc plated steel. Locknuts shall have internal threading. Locknuts constructed of PVC and locknuts with integral gasket or seal are not acceptable.
3. Conduit end bells shall be constructed of PVC and shall be smooth inside to accept a glued conduit connection. End bell shall have a smooth inner surface that curves outward towards the edge of the fitting.

2.04 PVC COATED RIGID GALVANIZED STEEL CONDUIT AND ASSOCIATED FITTINGS

A. General

1. Where an external coating of polyvinyl chloride (PVC) is specified for conduit and fittings, the coating shall be 40 mil (minimum) thickness. Where an internal coating of urethane is specified for conduit and fittings, the coating shall be 2 mil (minimum) thickness.
2. All conduit fittings shall have a sealing sleeve constructed of PVC which covers all connections to conduit. Sleeves shall be appropriately sized so that no conduit threads will be exposed after assembly.

B. Conduit

1. Conduit shall be hot dip galvanized on the inside and outside and made of heavy wall high strength ductile steel. Conduit shall be manufactured in accordance with ANSI C80.1 and shall be UL 6 Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.

3. Conduit shall be coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit shall be manufactured in accordance with NEMA RN 1.

C. Conduit Bodies for use with PVC Coated Rigid Galvanized Steel Conduit

1. Conduit bodies shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies for Class I, Division 1 hazardous areas shall be provided with integrally threaded covers constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.
3. Conduit bodies for all other areas shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Covers shall be affixed in place by stainless steel screws which thread directly into the conduit body and have a plastic encapsulated head. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

D. Conduit Couplings, Nipples, and Unions for use with PVC Coated Rigid Galvanized Steel Conduit

1. Couplings and nipples shall be threaded and shall be constructed of hot dipped galvanized steel which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Split-type couplings that use compression to connect conduits are not acceptable.
2. Unions shall be threaded, rain-tight, and constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.

E. Conduit Expansion and Deflection Fittings for use with PVC Coated Rigid Galvanized Steel Conduit

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of bronze or an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Expansion and deflection fittings shall have threaded conduit connections.
2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

F. Conduit Seals for use with PVC Coated Rigid Galvanized Steel Conduit

1. Conduit seals shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit seals shall have threaded conduit connections.

G. Conduit Termination Fittings for Use with PVC Coated Rigid Galvanized Steel Conduit

1. Conduit hubs shall be constructed of an electro-galvanized malleable iron alloy which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Hubs shall have threaded connections to the conduit and enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.
2. Conduit bonding bushings shall be constructed of zinc plated malleable iron which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.05 RIGID ALUMINUM CONDUIT AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be made of heavy wall high strength 6063 alloy aluminum with temper designation T1 as defined by the Aluminum Association. Conduit shall be manufactured in accordance with ANSI C80.5 and shall be UL 6A Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.

B. Conduit Bodies for use with Rigid Aluminum Conduit

1. Conduit bodies shall be constructed of copper-free aluminum which is coated with an aluminum enamel finish. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies for Class I, Division 1 hazardous areas shall be provided with integrally threaded covers constructed of copper-free aluminum which is coated with an aluminum enamel finish.

3. Conduit bodies for all other areas shall be provided with stamped copper-free aluminum covers that are affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

C. Conduit Couplings, Nipples, and Unions for use with Rigid Aluminum Conduit

1. Couplings and nipples shall be threaded and shall be constructed of heavy wall high strength 6063 alloy aluminum with temper designation T1. Split-type couplings that use compression to connect conduits are not acceptable.
2. Unions shall be threaded, rain-tight, and constructed of copper-free aluminum which is coated with an aluminum enamel finish.

D. Conduit Expansion and Deflection Fittings for use with Rigid Aluminum Conduit

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of copper-free aluminum which is coated with an aluminum enamel finish. Expansion and deflection fittings shall have threaded conduit connections.
2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

E. Conduit Seals for use with Rigid Aluminum Conduit

1. Conduit seals shall be constructed of copper-free aluminum which is coated with an aluminum enamel finish. Conduit seals shall have threaded conduit connections.

F. Conduit Termination Fittings for use with Rigid Aluminum Conduit

1. Conduit hubs shall be constructed of copper-free aluminum and shall have threaded connections to the conduit and enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.
2. Conduit locknuts shall be constructed of copper-free aluminum. Locknuts shall have internal threading. Locknuts with integral gasket or seal are not acceptable. Locknuts shall have integral bonding screw where required for proper bonding.
3. Conduit bonding bushings shall be constructed of copper-free aluminum. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.06 PVC COATED RIGID ALUMINUM CONDUIT AND ASSOCIATED FITTINGS

A. General

1. Where an external coating of polyvinyl chloride (PVC) is specified for conduit and fittings, the coating shall be 40 mil (minimum) thickness. Where an internal coating of urethane is specified for conduit and fittings, the coating shall be 2 mil (minimum) thickness.
2. All conduit fittings shall have a sealing sleeve constructed of PVC which covers all connections to conduit. Sleeves shall be appropriately sized so that no conduit threads will be exposed after assembly.

B. Conduit

1. Conduit shall be made of heavy wall high strength 6063 alloy aluminum with temper designation T1. Conduit shall be manufactured in accordance with ANSI C80.5 and shall be UL 6A Listed.
2. Conduit shall be provided with factory-cut 3/4 inch per foot tapered threads at each end in accordance with ANSI B1.20.1. Threads shall be cut prior to galvanizing to ensure corrosion protection adequately protects the threads. Conduit shall be provided with a matching coupling on one end and a color-coded thread protector on the other.
3. Conduit shall be coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit shall be manufactured in accordance with NEMA RN 1.

C. Conduit Bodies for use with PVC Coated Rigid Aluminum Conduit

1. Conduit bodies shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies for Class I Division 1 hazardous areas shall be provided with integrally threaded covers constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.
3. Conduit bodies for all other areas shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Covers shall be affixed in place by stainless steel screws which thread directly into the conduit body and have a plastic encapsulated head. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

D. Conduit Couplings, Nipples, and Unions for use with PVC Coated Rigid Aluminum Conduit

1. Couplings and nipples shall be threaded and shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Split-type couplings that use compression to connect conduits are not acceptable.
2. Unions shall be threaded, rain-tight, and constructed of copper free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane.

E. Conduit Expansion and Deflection Fittings for use with PVC Coated Rigid Aluminum Conduit

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Expansion and deflection fittings shall have threaded conduit connections.
2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

F. Conduit Seals for use with PVC Coated Rigid Aluminum Conduit

1. Conduit seal shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Conduit seals shall have threaded conduit connections.

G. Conduit Termination Fittings for use with PVC Coated Rigid Aluminum Conduit

1. Conduit hubs shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Hubs shall have threaded connections to the conduit and enclosure. Hubs shall have a plastic insulated throat and shall be watertight when assembled to an enclosure.
2. Conduit bonding bushings shall be constructed of copper-free aluminum which is coated on the exterior with a PVC jacket and coated on the interior with a layer of urethane. Bonding bushings shall have a threaded conduit connection. Bonding bushing shall be provided with properly sized set screw for connecting bonding conductor and an integral plastic insulator rated for 150 degrees C located in the throat.

2.07 LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be manufactured using a single strip of hot dip galvanized high strength steel alloy, helically formed into a continuously interlocked flexible metal conduit. Trade size 1-1/4 inch and smaller conduits shall be provided with an integrally woven copper bonding strip.
2. Conduit shall be covered with an outside PVC jacket that is UV resistant, moisture-proof, and oil-proof. Conduit shall be UL 360 Listed. Conduits shall be Listed for and marked with maximum temperature ratings as follows:
 - a. 105 degrees C dry, 60 degrees C wet for all conduit installed against or within 2 inches of equipment capable of having a surface temperature of 80 degrees C or greater (e.g., blowers, incinerators, etc.)
 - b. 80 degrees C dry, 60 degrees C wet for all other locations

B. Conduit Termination Fittings for use with LFMC

1. Conduit termination fittings shall be constructed of either 304 stainless steel or an electro-galvanized malleable iron alloy which is coated on the exterior with a 40 mil (minimum) PVC jacket and coated on the interior with a 2 mil (minimum) layer of urethane. PVC coated fittings shall have a sealing sleeve constructed of PVC which covers the connection to conduit.
2. Termination fittings shall have a threaded end with matching locknut and sealing ring for termination to equipment and shall have an integral external bonding lug where required for proper bonding. Termination fittings shall have a plastic insulated throat and shall be watertight when assembled to the conduit and equipment.

2.08 LIQUID TIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be constructed of rigid polyvinyl chloride (PVC), fabricated to provide flexibility. Conduit shall be covered with an outside PVC jacket that is UV resistant, moisture-proof, and oil-proof. Conduit shall be UL 1660 Listed and be Type LFNC-B.

B. Conduit Termination Fittings for use with LFNC

1. Conduit termination fittings shall be constructed PVC and shall have a threaded end with matching locknut and sealing ring for termination to equipment. Termination fittings shall be watertight when assembled to the conduit and equipment.

2.09 FLEXIBLE METAL CONDUIT (FMC) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be manufactured using a single strip of hot dip galvanized high strength steel alloy, helically formed into a continuously interlocked flexible metal conduit. Conduit shall be UL 1 Listed.

B. Conduit Termination Fittings for use with FMC

1. Conduit termination fittings shall be constructed of an electro-galvanized malleable iron alloy. Fittings shall have a threaded end with matching locknut for termination to equipment, and a compression-style connection to the associated conduit.

2.10 ELECTRICAL METALLIC TUBING (EMT) AND ASSOCIATED FITTINGS

A. Conduit

1. Conduit shall be hot dipped galvanized on the inside and outside and made of cold-rolled steel tubing. Conduit shall be manufactured in accordance with C80.3 and shall be UL 797 Listed.

B. Conduit Bodies for use with EMT

1. Conduit bodies shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Conduit bodies shall have integral threaded conduit hubs.
2. Conduit bodies shall be provided with galvanized sheet steel covers that are affixed in place by stainless steel screws which thread directly into the conduit body. Covers that utilize wedge nuts or any other method of attachment to the conduit body are not acceptable. Covers shall be provided with matching gasket.

C. Conduit Couplings and Nipples for use with EMT

1. Couplings and nipples shall have threaded compression connectors with associated gland and shall be constructed of electro-galvanized steel. Fittings utilizing a set screw or indenter tool to secure the associated conduit to the fitting are not acceptable. Couplings and nipples shall be rain-tight and have a plastic insulated throat.

D. Conduit Expansion and Deflection Fittings for use with EMT

1. Conduit expansion fittings and conduit deflection fittings shall be constructed of an electro-galvanized malleable iron alloy which is coated with an acrylic paint finish. Expansion and deflection fittings shall have threaded conduit connections.

2. Expansion fittings shall have an integral bonding jumper and deflection fittings shall have an external bonding jumper.

E. Conduit Termination Fittings for use with EMT

1. Conduit termination fittings shall be constructed of electro-galvanized steel and have a plastic insulated throat. Termination fittings shall have a threaded compression connector with associated gland on one end and external threads on the other end. Termination fittings utilizing a set screw or indenter tool to secure the associated conduit to the fitting are not acceptable.
2. Conduit locknuts shall be constructed of zinc plated steel. Locknuts shall have internal threading. Locknuts shall have integral bonding screw where required for proper bonding.

2.11 CONDUIT BENDS

- A. Rigid conduit bends, both factory-fabricated and field-fabricated, shall meet the same requirements listed in the articles above for the respective conduit type and material of construction.

- B. Conduit bend radii for standard radius bends shall be no less than as follows:

Trade Size (inches)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6
Min. Radius (inches)	4-1/2	5-3/4	7-1/4	8-1/4	9-1/2	10-1/2	13	15	16	24	30

- C. Conduit bend radii for long radius bends shall be no less than as follows:

Trade Size (inches)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6
Min. Radius (inches)	N/A	12	18	24	30	30	36	36	48	48	60

2.12 MISCELLANEOUS

- A. Conduit Periphery Sealing

1. The sealing of the exterior surface of conduits to prevent water and/or air from passing around the conduit periphery from one space to another (where required) shall be through the use of one of the following:

- a. A conduit sleeve and pressure bushing sealing system. Acceptable products are FSK by OZ-GEDNEY, Link-Seal by Crouse-Hinds, or Engineer approved equal.
 - b. A conduit sleeve that is two trade sizes larger than the conduit being sealed, with 2-hour fire rated UL 1479 Listed caulk filling the entire void between the conduit and sleeve. This method is only suitable for penetrations in non-fire rated walls and floors between spaces within buildings. This method shall not be used for the sealing of conduits leaving a building and/or structure.
2. Conduit penetrations through fire-rated walls and floors shall be made with an approved UL 1479 Listed product specifically intended for the trade size of the conduit.

B. Primer and Cement

1. Nonmetallic conduit shall be cleaned with primer and connected to fittings with the manufacturer's recommended cement that is labeled Low VOC.

C. Galvanizing Compounds

1. Galvanizing compounds for field application shall be the cold-applied type, containing no less than 93% pure zinc.

D. Conduit Interior Sealing

1. For all conduits that have cables inside, the sealing of the inside of the conduits against water ingress shall be achieved through the use of one of the following:
 - a. Two-part expanding polyurethane foam sealing compound, dispensed from a single tube which mixes the two parts as it is injected into the conduit. Expanding foam shall be compatible with the conduit material of construction as well as the outer jacket of the cables in the conduit. Acceptable products are Q-Pak 2000 by Chemque, FST by American Polywater Corporation, or Hydra-seal S-60 by Duraline.
 - b. Inflatable bag that provides seal around cables and around inside diameter of conduit. Provide appropriate quantity of additional fittings for applications with three or more cables in the conduit to be sealed. Acceptable products are Rayflate by Raychem, or Engineer approved equal. This sealing method is only applicable to conduits trade size 2 inch and larger.
 - c. Neoprene sealing ring provided with the required quantity and diameter of holes to accommodate the cables in each conduit. Sealing ring shall be compressed by two stainless steel pressure plates. Acceptable products are

type CSB by OZ-GEDNEY, or Engineer approved equal. This sealing method is only applicable to metallic conduits containing 4 or less cables.

2. The use of aerosol-based expanding foam sealants or any other method of sealing against water ingress not listed above is not acceptable.
3. For conduits identified as spares, the sealing of the inside of the conduit against water ingress shall be achieved by using appropriately sized rubber expanding-style conduit plugs. Plugs that are held in place only by friction are not acceptable.

E. Pull Rope

1. Pull ropes for empty and/or spare conduits shall be woven polyester, ½-inch wide, with a minimum tensile strength of 1250 lbs.
2. Pull ropes for the Contractors use in installing conductors shall be the size and strength required for the pull and shall be made of a non-metallic material.

PART 3 – EXECUTION

3.01 GENERAL

- A. All conduit and associated fittings and appurtenances shall be installed in accordance with NECA 1.
- B. Minimum trade size for all rigid conduits shall be 3/4 inch in exposed applications and 1 inch in embedded applications. Conduits installed within ductbanks shall be allowed to be increased in size to trade size 2 inch, at the Contractor's option, to accommodate the saddle size of the ductbank spacers. However, no combining of circuits shall be allowed in the larger conduits.
- C. Minimum trade size for flexible conduits (where specifically allowed herein) shall be 1/2 inch in all applications.
- D. Empty and/or spare conduits shall be provided with pull ropes which have no less than 12 inches of slack at each end.
- E. Nonmetallic conduits for installations requiring less than a factory length of conduit shall be field cut to the required length. The cut shall be made square, cleaned of debris, and primer shall be applied to ready each joint for fusing. Conduits shall then be fused together with the conduit manufacturer's approved cement compound.
- F. Metallic conduits for installations requiring less than a factory length of conduit shall be field cut to the required length. The cut shall be made square, be cleaned of all debris

and be de-burred, then threaded. Conduit threading performed in the field shall be $\frac{3}{4}$ inch per foot tapered threads in accordance with ANSI B1.20.1.

- G. Conduits shall be protected from moisture, corrosion, and physical damage during construction. Install dust-tight and water-tight conduit fittings on the ends of all conduits immediately after installation and do not remove until conductors are installed.
- H. Conduits shall be installed to provide no less than 12 inches clearance from pipes that have the potential to impart heat upon the conduit. Such pipes include, but are not limited to, hot water pipes, steam pipes, exhaust pipes, and blower air pipes. Clearance shall be maintained whether conduit is installed in parallel or in crossing of pipes.
- I. Where non-metallic instrumentation conduits are installed exposed, the following clearances to other conduit types shall be maintained:
 - 1. Instrumentation conduits installed parallel to conduits with conductors energized at 480V or above shall be 18 inches.
 - 2. Instrumentation conduits installed parallel to conduits with conductors energized at 240V and below shall be 12 inches.
 - 3. Instrumentation conduits installed at right angles to conductors energized at 480V and below shall be 6 inches.
 - 4. Instrumentation conduits installed at right angles to conductors energized at voltages above 480V shall be 12 inches.
- J. Where conduit fittings do not include an integral insulated bushing, an insulated bushing shall be installed at all conduit termination points.
- K. Conduits which serve multi-section equipment shall be terminated in the section where wiring terminations will be made.
- L. Conduits that terminate at roof mounted equipment shall be installed through the roof curb for the associated equipment to avoid additional roof penetrations wherever possible. Conduits that are installed horizontally on roof surfaces shall be supported by roof blocks that do not impact the roof manufacturer's warranty and shall be installed at least $\frac{7}{8}$ inch above the roof surface to avoid the need to further de-rate the conductors inside.
- M. In no case shall conduit be supported or fastened to another pipe or be installed in a manner that would prevent the removal of other pipes for repairs. Spring steel fasteners may only be used to affix conduits containing lighting branch circuits within EMT conduits to structural steel members.

- N. All field fabricated threads for rigid galvanized steel conduit shall be thoroughly coated with two coats of galvanizing compound, allowing at least two minutes to elapse between coats for proper drying.
- O. The appropriate specialized tools shall be used for the installation of PVC coated conduit and conduit fittings. No damage to the PVC coating shall occur during installation. Conduit and conduit fittings with damaged PVC coating shall be replaced at the Contractor's cost. The use of PVC coating touch-up compounds is not permitted.
- P. Conduits which emerge from within or below concrete encasement shall be PVC coated rigid galvanized steel in accordance with Standard Detail E-26-0102 where the conduit is not protected by an equipment enclosure that surrounds the conduit on all sides at the point where it emerges from the encasement.
- Q. Aluminum conduits shall not be installed in direct contact with concrete surfaces. Where aluminum conduits are routed along concrete surfaces, they shall be installed with one-hole electro-galvanized malleable iron alloy straps with matching clamp-backs to space the conduit ¼ inch away from concrete surface. Where aluminum conduit passes through concrete, CMU or brick walls, the penetration shall be made such that the aluminum conduit does not come in contact with concrete, CMU, brick or mortar.

3.02 CONCEALED AND EMBEDDED CONDUITS

- A. Conduits are permitted to be installed concealed and/or embedded with the following requirements:
 - 1. Conduits shall not be installed horizontally when concealed within CMU walls, only vertical installation is acceptable.
 - 2. Conduits installed embedded within concrete floors or walls shall be located so as not to affect the designed structural strength of the floor or wall. Embedded conduits shall be installed in accordance with Standard Detail S-03-0403 and ACI-318.
 - 3. Where conduit bends emerge from concrete embedment, none of the curved portion of the bend shall be visible. Only the straight portion of the bend shall be visible. The straight portion shall emerge perpendicular to the embedment (i.e., neatly oriented 90-degrees to floor/slab/grade). Conduits that emerge in a non-perpendicular orientation are not acceptable.
 - 4. Where multiple conduits emerge from concrete embedment or from concealment below a concrete floor, ample clear space shall be provided between conduits to allow for the appropriate and required conduit termination fittings to be installed.

5. Conduits installed embedded within concrete encasement of any kind shall be installed such that conduit couplings for parallel conduits are staggered so that they are not side by side.
- B. Conduits are NOT permitted to be installed concealed and/or embedded for the following situations:
1. Conduits shall not be installed embedded within any water-bearing floors or walls. Conduits shall not be installed embedded within any liquid containment area floors or walls.
 2. Conduits shall not be installed concealed within CMU walls or gypsum walls that are adjacent to Class I and II hazardous areas (Division 1 and Division 2).
 3. Conduits shall not be installed concealed within CMU walls or gypsum walls that are adjacent to indoor Type 1 or Type 2 chemical storage/transfer areas.

3.03 CONDUIT FITTING USES AND APPLICATIONS

A. General

1. Conduit fittings shall be furnished and installed in the materials of construction as indicated in Part 2, herein. Conduit fitting materials of construction are dependent on the material of construction used for the associated conduit.
2. Conduit fittings shall be provided in the trade size and configuration required to suit the application.

B. Conduit Bodies

1. Conduit bodies shall be installed where wire pulling points are desired or required, or where changes in conduit direction or breaking around beams is required.
2. Where conduit bodies larger than trade size 2 inches are intended to be used as a pull-through fitting during wire installation, oversized or elongated conduit bodies shall be used. Oversized or elongated conduit bodies shall not be required if the conduit body is intended to be used as a pull-out point during wire installation.

C. Conduit Nipples and Unions

1. Conduits with running threads shall not be used in place of 3-piece couplings (unions) or close nipples. After installation of a conduit fitting of any kind, there shall be no more than ¼ inch of exposed threads visible. Factory fabricated all-thread nipples may be used between adjacent enclosures, however, the same restriction applies regarding the length of exposed threads that are visible.

D. Conduit Expansion and Deflection Fittings

1. Conduit expansion fittings shall be installed where required by the NEC and where indicated on the Drawings. Expansion fittings shall also be installed for exposed straight metallic conduit runs of more than 75 feet, in both indoor and outdoor locations. Expansion fittings for runs of non-metallic conduit shall be installed in accordance with the NEC.
2. Conduit deflection fittings shall be installed where required by the NEC and where conduits are installed (exposed and concealed) across structural expansion joints.
3. Unless otherwise specified herein, conduit expansion and deflection fittings shall be installed in accordance with the Installation Guidelines published within NEMA FB 2.40.

E. Conduit Seals: furnish at all indoor/outdoor transition points.

F. Conduit Termination Fittings

1. Where conduits terminate at enclosures with a NEMA 4, 4X, or 3R rating and the enclosure does not have integral conduit hubs, an appropriately sized watertight conduit hub shall be installed to maintain the integrity of the enclosure. The use of locknuts with integral gasket in lieu of watertight conduit hubs is not acceptable.
2. Where conduits terminate at enclosures that do not require conduit hubs, a two-locknut system shall be used to secure the conduit to the enclosure. One locknut shall be installed on the outside of the enclosure, and the other inside, drawn tight against the enclosure wall. The locknut on the interior of the enclosure shall be the type with integral bonding lug, or a conduit bonding bushing may be used in place of the interior locknut.
3. Conduits shall not be installed such that conduit fittings penetrate the top of any enclosure located outdoors, except in cases where specifically required by the serving electric utility. Conduits which serve outdoor equipment or an enclosure from above shall instead be routed into the side of the enclosure at the bottom. The conduit termination fitting shall be provided with a conduit drain to divert moisture from the raceway away from the enclosure.

3.04 MISCELLANEOUS

A. Conduit Periphery Sealing

1. All conduit penetrations through exterior walls shall be sealed around the periphery using the appropriate products specified in Part 2 herein to prevent air and/or water entry into the structure.

2. All conduit penetrations through interior walls and floors shall be sealed through the use of conduit sleeves and caulk as specified in Part 2 herein. Alternatively, mortar may be used to seal around the conduit periphery.
3. Conduit penetrations through fire-rated walls as floors shall be made with the appropriate fire rated penetration product.

B. Conduit Interior Sealing

1. All conduits (including spares) entering a structure below grade shall be sealed on the interior of the conduit against water ingress. Sealing shall be at an accessible location in the conduit system located within the building structure and shall be via one of the methods specified in Part 2 herein. If conduit sealing cannot be achieved at an accessible location within the building structure, sealing shall be placed in the conduits in the nearest manhole or handhole outside the structure.
2. Conduit interior sealing shall not be installed until conductors inside are tested and test results are deemed acceptable by the Engineer. Conduit interior sealing shall be installed prior to energization of the conductors inside.

END OF SECTION